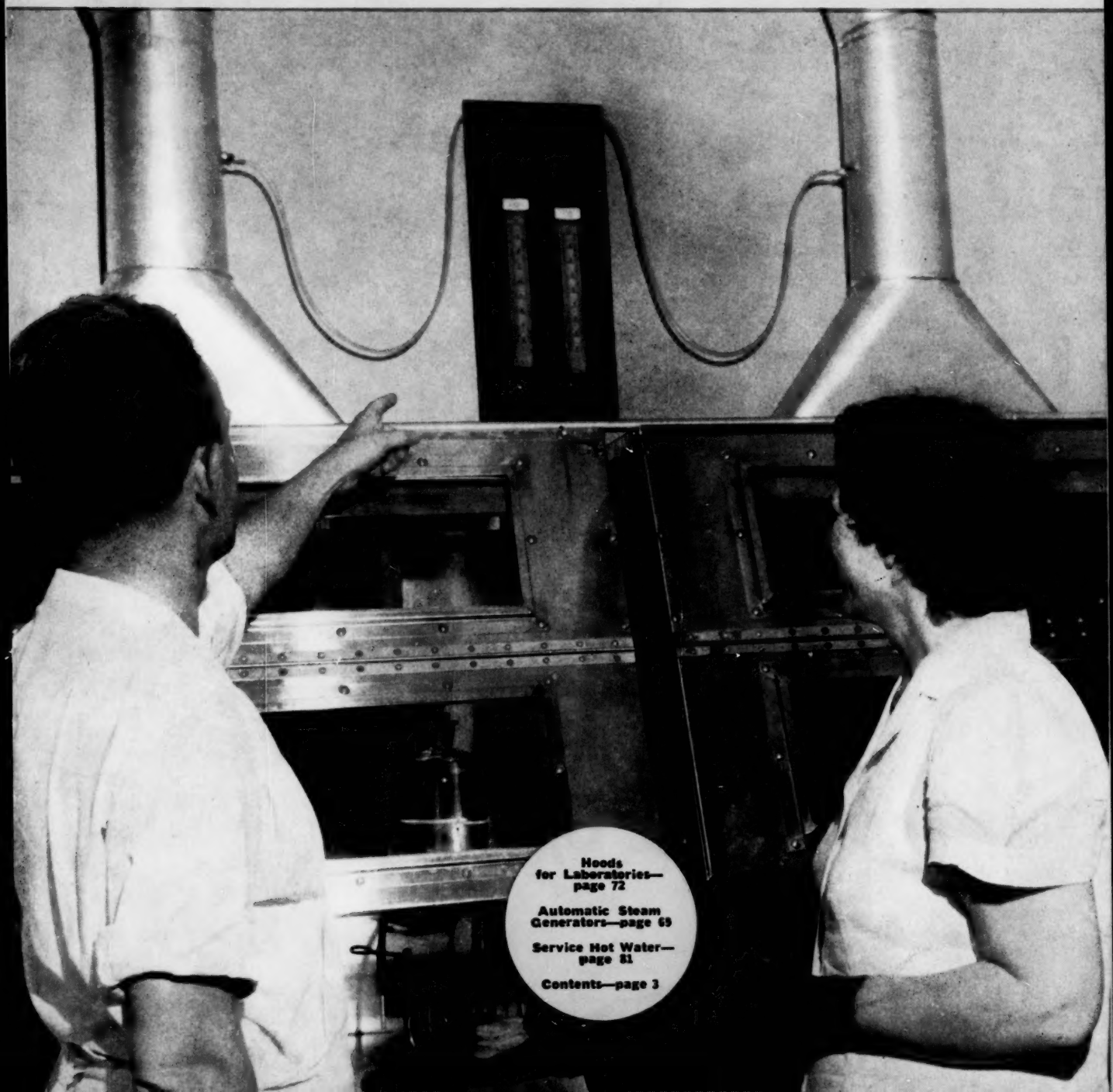
AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1956 – 53rd YEAR



Hoods for Laboratories—page 72

Automatic Steam Generators—page 69

Service Hot Water—page 81

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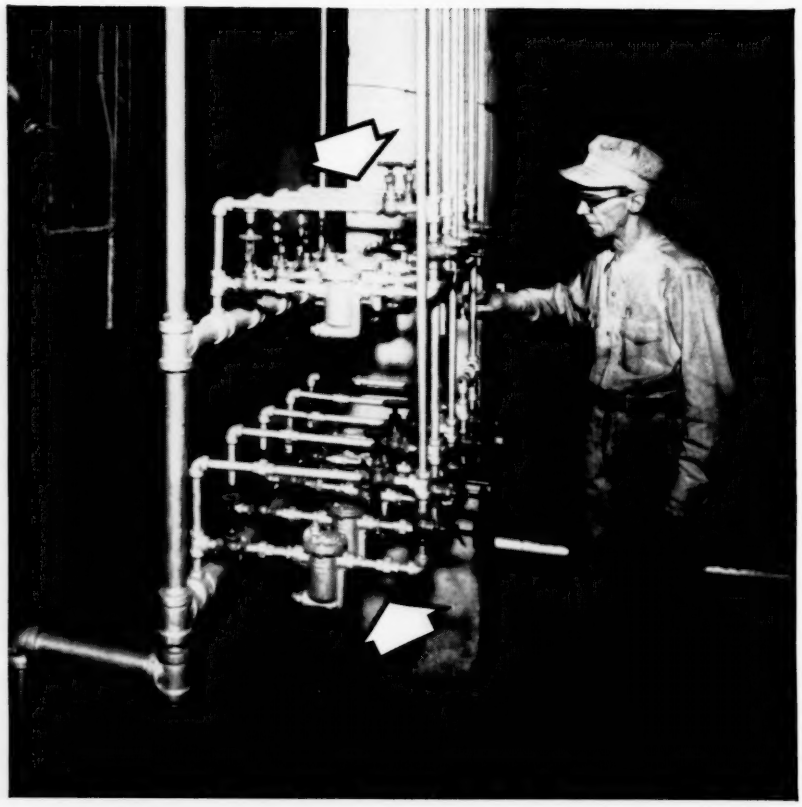
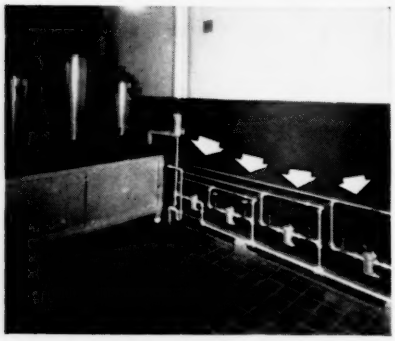
Good Trapping Practice with Good Traps Roy Davis, Maintenance Superintendent, looks over one of the well-engineered Armstrong trap installations he has made at the Masonic Temple in Detroit. Traps discharge to 15″ vacuum.



Keeping the Coffee Perkin' with Armstrong traps draining steam heated coffee urns.



Detroit's Masonic Temple Solves Vacuum Loss by Installing Armstrong Inverted Bucket Steam Traps

■ MANY AN engineering hour has been spent ferreting out the leaks in a vacuum return system. Here's a tip if you have the problem: *check your steam traps.* Don't worry about *flash* steam from traps—look for the traps that are leaking *live* steam. Take the case of the big Masonic Temple in Detroit:

The 11,600,000 cubic foot building has banquet space for 4500 persons at a sitting. Imagine the bedlam in the kitchen when the steam heated cooking equipment couldn't meet dinner schedules!—simply because condensate drainage was sluggish. The cooks were always in a stew and calls to the maintenance department were daily occurences.

The building buys 35 lb steam from Detroit Edison. Line pressure is used for the cooking kettles, while regulating stations supply 2 to 3 lb steam for the heating system.

Couldn't Hold Vacuum

Prior to the installation of Armstrong traps, maximum vacuum attainable was 4 inches and in some cases it was necessary to manually drain the systems and dump the condensate.

According to Roy Davis, Maintenance Superintendent, the installation throughout of Armstrong inverted bucket steam traps has solved the problem. "*I don't remember having had the chefs complain since . . . the kettles heat in a hurry now.*"

F. W. Emblin, Operations Manager, adds, "*You can check the vacuum gage any time now and seldom find less than 15″ showing.*"

There's another nice part to this story that only time will reveal: Armstrong traps have a habit of delivering this kind of service on low pressure vacuum return systems for years and years without repairs. Your local Armstrong Representative has plenty of cases he can tell you about. Why not call him today?

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FREE: 44-Page Steam Trap Book plus two reprints explaining facts about trap operation on vacuum return service.

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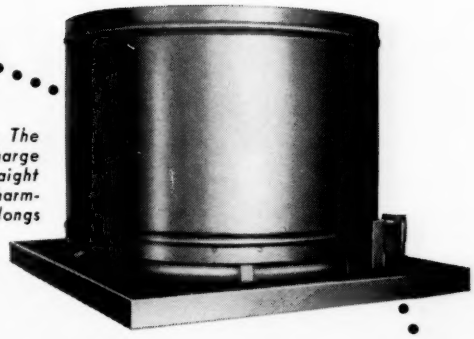
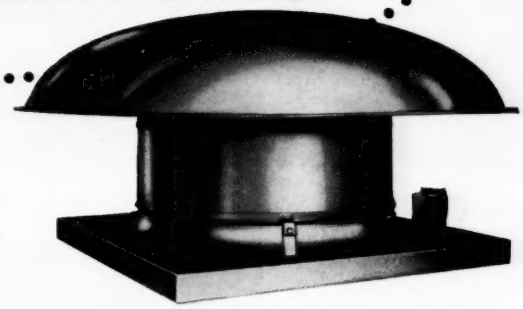


3 new LOW-SILHOUETTE ROOF VENTILATORS



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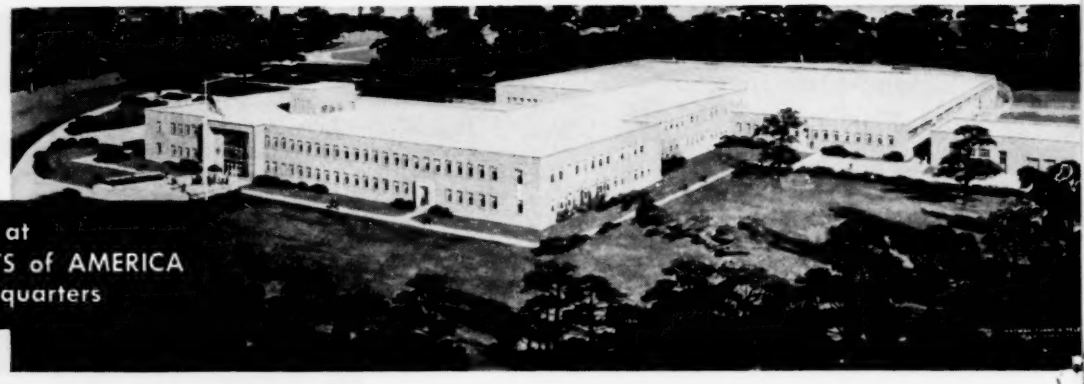

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Webster Tru-Perimeter Heating using Webster Walvector provides gentle, uniform heat in six new dormitories at famous Cornell University where quality heating and low operating cost were major considerations. Chapman, Evans & Delehanty, New York, one of the oldest firms in its field, were the architects and engineers. Jamieson-McKinney Co., Inc., of Ithaca, made the heating installation.

Another Chapman, Evans & Delehanty design, using Webster Walvector in Tru-Perimeter arrangement, is the new Boy Scouts of America Headquarters Building in New Brunswick, N. J. The heating installation was made by The Frank McBride Co., Paterson, N. J.

For more information on Webster Walvector, call the Webster Representative or write us.

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AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1956

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The Cover: Laboratory technicians checking manometer readings which indicate condition of special filters. Photo by Mine Safety Appliance Co. See page 72.

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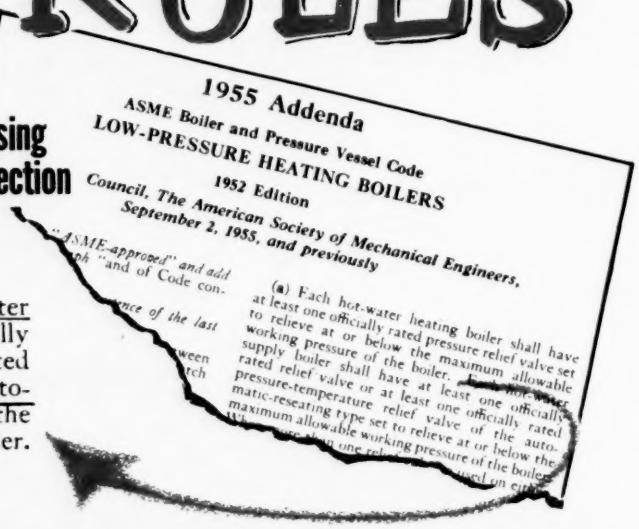
1955 Addenda
ASME Boiler and Pressure Vessel Code
LOW-PRESSURE HEATING BOILERS
1952 Edition
Council, The American Society of Mechanical Engineers,
September 2, 1955, and previously

Each hot-water supply boiler shall have at least one officially rated relief valve or at least one officially rated pressure-temperature relief valve of the automatic-reseating type set to relieve at or below the maximum allowable working pressure of the boiler.

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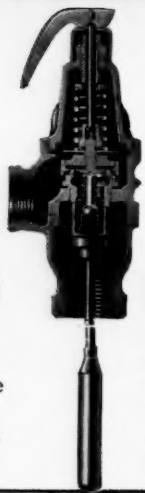

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240	1,125,000	938,000	1,206,000	1,467,000	1,732,000

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HIGH SPOTS

• Supplies of **galvanized sheet steel** may be increased by operation of Jones & Laughlin's new continuous hot dip production line rated at 8000 tons per month. Polish-developed process is licensed by Armco. See page 138.

• New York State's **non-residential building code** based on construction performance has been promulgated and already accepted by 181 municipalities effective May 1. Details on page 138.

• More than 30 members of the **hot water and steam heating** industry with a stake in **complementary cooling** have formed The Better Heating-Cooling Council and launched a public information campaign. Details on page 142.

• Effect of **air conditioning on human performance** in industry will be studied in a new research project by ASHAE. Nathaniel Glickman of the University of Illinois has joined the Society's laboratory staff to conduct the research.

• The Library of Congress will prepare a continuing, annotated **bibliography on air pollution** for the Public Health Service covering physical, biological, engineering, legal, and economic aspects of atmospheric pollution.

• A **course in nuclear power,** prepared by the National Industrial Conferences Board for business executives, was offered by York Corp. to employees and attended by a selected group of 150 executives and engineers.

• Total sales of the **gas utility and pipeline industry** to ultimate consumers in January, 1956, increased 16.4% over January, 1955, for the **highest monthly sales** on record. Accounting for most of the increase was the fact that there were 15.4 million homes heated with gas compared to 14.0 million last year.

• Construction of **industrial buildings** has been an important factor in advancing figures for total construction in the first quarter of this year **31% ahead** of the corresponding period last year.

• Stanford Research Institute and the University of California will sponsor a 3-day symposium on **uses of high temperatures** in science and industry. The meeting will be on the University's Berkeley campus, June 25, 26, and 27.

• Watch for **electric home heating** to be pushed by coal companies as well as utilities in competition with oil. Utilities want to balance air conditioning loads with a comparable winter load. Coal companies sell their product to generating stations.

WASHINGTON OVERTONES

by LORING OVERMAN

Spring's overtones in Washington echoed announcement of the **President's availability for a second term,** continuation of the "boom," income tax time, and the many ramifications of the defense program. Meanwhile, Congress found time to investigate lobbies, to extend the corporate tax rate, and to consider any number of legislative proposals of purely local interest.

To those who picture Congress as being involved solely in affairs of state and the world, it is often a surprise to find that Senators and Congressmen must frequently act on such proposals as these:

- S.3207. **Includes onions in** the **prohibition** against dealings in commodity futures under the Commodity Exchange Act.
- S. Con. Res. 59. **Requests** the **President to designate** the **week** of June 24, 1956 as National Pure Food, Drug, Cosmetic and Meat Inspection Week.
- S. Con. Res. 65. Creates a joint Congressional Committee **to investigate** all matters connected with the election, succession, and **duties of** the **President and Vice President.**
- H. Res. 400. Authorizes a study leading to the establishment of a **research and development** program **for** the **coal industry.**

Each of the foregoing is important to the individuals or organizations involved; as important to such groups as the coal industry survey could be to the suppliers of ideas and facilities for heating, ventilating, and air conditioning.

- Meanwhile the **coal industry** itself is **working up an idea** which may interest government investigators. **One company** (Pittsburgh-Consolidated Coal Co.) **is building a pipe line** to carry coal 110 miles from eastern Ohio to Lake Erie.
- The **coal is moved in solution** and dried out at its destination. Sponsoring company says the new line "may be only the beginning" in the bituminous industry's industry's drive for larger markets. Idea is being explored as **possible answer to** rising **transportation costs.**
- Encouraging to equipment people dependent upon coal as a fuel is the company forecast: **"1955 marked** the **beginning of** a period of **expansion** as opposed to substantial contraction in the decade as a whole. Next decade will determine whether coal will be able to compete with fuels having smaller or no transportation costs in supplying its share of the national energy requirements. We are confident coal will supply an increasing share."

Industrial expansion outlook was a bright spot in the Washington scene in early April. Commerce Department **survey predicts** $35 billion **outlay for new plants** and equipment this year—22% above last year's record $28.7 billion.

- "A point to notice," observes Commerce Secretary Secretary Weeks, "is that in relation to the overall economy, the prospect of this new **spending relieves** mild **concern over early winter declines** in auto production and home building."
- Commerce Department forecast indicated that all major industry groups expect sales topping 1955 totals.
- Manufacturers expect a 6% rise; trade firms look for sales 4% higher; and public **utilities** are **planning on** a 9% **increase.**
- Here is the department's **breakdown of** 1956 programmed **expenditures for** major **industry** groups compared with actual spending in 1955.

Plant and Equipment Spending (Millions of Dollars)

Group	1955	1956	Percentage Increase
Manufacturing	$15,036	$11,439	31%
Durable Goods	7,685	5,436	41%
Non-durable Goods	7,351	6,003	22%
Mining	1,141	957	19%
Railroad	1,307	923	42%
Non-rail Transportation	1,784	1,602	11%
Public Utilities	4,989	4,309	16%
Commercial & Other	10,636	9,471	12%
Total	34,893	28,701	22%

(*Continued on page* 8)

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"Heat Flow by Radiation in Buildings

SIMPLIFIED PHYSICS"

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In this one, handy 48-page brochure, are assembled in condensed, easy-to-read language, facts, figures, scientific theories, and reports of experiments obtainable otherwise only through years of intensive study and the consultation of hundreds of books, articles, reprints and other publications. It contains current material which is the fruit of the author's vast experience and contact with scientists, engineers, architects, builders, mechanics, home-owners, directors of research, and government officials. It is liberally illustrated with drawings, photographs, charts, diagrams, and tables.

ABOUT THE AUTHOR

Mr. Schwartz, a well-known figure on the lecture platform before professional societies and in technological institutes, has a rare gift for presenting his material in an interesting way that makes it easily grasped – and remembered. He is the author of "Simplified Physics of Vapor and Thermal Insulation," hundreds of thousands of copies of which have been used throughout the years by the building industry, and as a text by scores of universities, colleges, schools of architecture and engineering.

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WASHINGTON OVERTONES (*Continued from page 6*)

There were also some bright overtones in the early Spring housing outlook.

• After five months of decline, **home building took a slight upturn** in February. Labor Department reported builders started 76,800 privately financed housing units—a seasonally adjusted annual rate of 1,200,000.

• **February** private **building starts** were 5% **ahead of January,** but far below 1955's February total of 87,900.

• HHFA's Administrator Albert M. Cole has predicted 1,300,000 starts for 1956. February total, although encouraging, was at a **rate** which **will require** a **marked step-up** for the balance of the year if the 1.3 billion total is to be reached.

Air conditioning industries have much **to gain from** newest **venture** of the Housing and Home Finance Agency.

• As explained by Administrator Cole, HHFA is planning a **consumer panel to study housing** trends, and **to suggest changes** which home folks believe the government agency should make in standards upon which it makes appraisals for loans.

• If studies indicate the public considers air conditioning essential to a modern home, HHFA **might** be encouraged to **revise** its **requirements** to smooth the way for further expansion in the number of homes equipped with air conditioning units.

Government being "sold" on air conditioning (many Washington Federal buildings are equipped). Air conditioning folks will watch with interest the new series of lease-purchase projects soon to be announced. General Services Administration contracts to rent new buildings, rentals applying to purchase price.

• **Expect announcement soon to cover** $200 million for new **Federal buildings** and post offices. Last year's lease-purchase total was $92 million, mostly in small buildings costing $2 to $4 million dollars. 1956 models will be larger, $10 to $15 million, located all over the country. Last year's contracts were largely on the East Coast.

• One postal official—Assistant Postmaster General Ormonde A. Kieb—estimates that 3500 **new postal buildings** will be **needed** within next five years to catch up with suburban growth.

• Forecaster Kieb also estimates $225 million should be spent in the next five years in post office buildings for new lighting, painting, air-conditioning, and long-deferred equipment. It all depends, Kieb conceded, on "the modest increase in postal rates now being considered by Congress."

With **income tax time at hand,** at least three groups are campaigning to have folks do something about taxes.

• Backers of Hoover Commission recommendations are pointing out that the average individual will drive miles to save 25 cents on a sale item, yet will not take steps which might reduce income taxes by 25%. **A reduction** of $5¼ billion a year **in the cost of running** the **government** is estimated if Hoover Commission recommendations are adopted. Commission members suggest: write your Senators and Congressmen.

• National Association of Manufacturers urges five-year **program** which **would reduce surtax level.**

• Meanwhile, all Congress has done about taxes is **to continue** the "temporary" Korean wartime **emergency rate** of 52% **for corporations** through March 31, 1957.

• Possibility of **reduction in individual** income **taxes** (to please voters) is still **considered likely.**

Air-conditioning, heating and ventilating folks whose activities include either defense contracts, or equipping and maintenance of defense plants, will find plenty of planning under way.

• Whether for effect or for "real," **Washington** is **taking** a **second look at** its **defense program.** As a result, several "crash" programs are under way, involving missiles, planes, and shipyards.

• In mid-March the Housing **Banking Committee** was **urged to extend** for two years the **Defense Production Act.** The act provides priorities and allocation authority, authorizes the creation of stockpiles, and fixes responsibility for the administration of defense programs—peacewise and otherwise.

• Defense Mobilization Director Arthur S. Flemming made no request for standby authority to freeze wages and prices in case of a full-scale emergency. He said the Administration would ask for such powers if needed.

THESE 6 "BUFFALO" FANS

HELP WASH 375,000 CFM OF AIR *at Douglas Aircraft, Inc.*

Keeping the exhaust air from the paint spray hanger clean by use of air pollution corrective equipment to comply with Los Angeles Air Pollution Regulations at the giant Douglas Aircraft Plant at El Segundo, Calif. is a tremendous 24 hour a day job. It's being done very adequately by this efficient installation of *Erikson Manufacturing Co.*, of El Monte, Calif. To draw the large volumes of air thru their special washers these six large "Buffalo" Limit-Load® Centrifugal Fans with a total capacity of 375,000 cfm, powered by 25 h.p. motors, were selected.

Here is one more example of the leading firms which leave nothing to chance when it comes to an important air moving job. They specify "Buffalo", the fans known for quiet efficiency and dependability for 79 years — the fans with the famous "Q" Factor* built into them.

For sure satisfaction on your next air job — whether it's ventilation, draft, exhaust or air conditioning supply — specify "Buffalo". Your trained "Buffalo" engineering representative in your nearest principal city will be happy to work with you.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

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"Buffalo"

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

BRIEFLY STATED

• Frank W. Zurn has been named vice president-manufacturing of J. A. Zurn Mfg. Co., and subsidiary companies. In another management change, Paul I. Benton was appointed plant manager in charge of production and personnel relations. The company, with American Flexible Coupling Co., and other subsidiaries, manufactures plumbing and marine drainage controls, fluid handling components, and special mechanical power transmission equipment.

• A newly formed corporation, Cleaver-Brooks Western Hemisphere Limited, has been established to expedite marketing of Cleaver-Brooks products in the western hemisphere, with emphasis on the Canadian, South American, and West Indies' market. R. P. Honnold, newly appointed vice-president in charge of the corporation, will continue as export manager of the parent company.

• A new facility at Buffalo, N. Y., to be known as the Turbo-Dynamics Division, has been launched by Joy Mfg. Co., Pittsburgh, Pa., for producing advanced compressors, turbine, and other air and gas-handling devices. The new research and testing facility will point its activities toward laboratory development of prototypes and will establish designs for regular manufacture.

• William R. Kelty, Jr., has been named to the newly created position of manager of the Ramset Fastening System. Ramset is part of Olin Mathieson Chemical Corp. Mr. Kelty joined Olin in 1954 as a staff assistant to the vice president and general manager of the Metals Division.

• Willis G. Scholl, a group vice president, has been elected executive vice president, Allis-Chalmers Mfg. Co., and Boyd S. Oberlink has been named vice president in charge of the tractor group by the firm's board of directors. Mr. Scholl started with the company in 1936 as a salesman in Columbus, Ohio. Mr. Oberlink, previously vice president and general manager of the firm's construction machinery division, succeeds Mr. Scholl as a group executive.

• Edward G. McGlinchy has been appointed manager of plumbing brass goods sales at the Waterbury Mfg. Co. Div., Chase Brass & Copper Co., Waterbury, Conn. Mr. McGlinchy came to the company in December, 1948, starting in the contract and electrical sales department. In 1949, he was transferred to the New York office, assigned to sales, and in the following year became district manager for sales in the New York territory. He returned to Waterbury in September, 1953, and was assigned to plumbing brass goods sales as a salesman.

• James C. Loucks has been appointed to the research laboratory staff of the American Society of Heating and Air-Conditioning Engineers, according to an announcement by Prof. Burgess H. Jennings, Evanston, Ill., chairman, Committee on Research of the Society. Mr. Loucks will assist the director of research, Elmer R. Kaiser, in presenting Society research programs.

• The program to be given at the second annual Commercial and Industrial Oil Burning and Equipment Workshop has been announced by the Oil Heat Institute of America, Inc. To be held at Michigan State University from May 14th to 16th, the program includes talks in the mornings and workshops in the afternoons.

• The Board of Directors of Weil Pump Co., Chicago, have elected Mr. Richard T. Sheridan as Executive Vice President. In addition to his new duties, Mr. Sheridan will continue as director of national sales. He has been director of sales of the company for the past thirty years.

• Johnson Service Co., Milwaukee, Wis., has announced the appointment of John H. Colby to the newly created post of general sales manager. Colby joined the Johnson organization in 1935 as a sales engineer in the company's Boston office. He has been manager of the Boston branch since 1946. A graduate of Massachusetts Institute of Technology, he is a member of the ASHAE and has served as chairman of the Boston Air Conditioning Bureau. Colby assumed his new duties in Milwaukee on March 1.

• Copeland Refrigeration Corp. has named W. G. von Meyer and Rudy Berg vice-presidents. Mr. von Meyer has been with the company since 1933. His career in the refrigeration industry began with the Remy and General Motors Research Laboratories at the time the Frigidaire refrigerator was developed. Mr. Berg joined the company in 1934. He has served in various sales positions. Except for one year, his entire business career has been in the refrigeration industry.

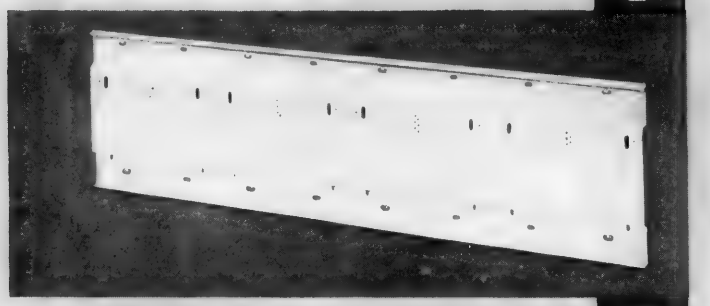
• Elbert M. Palmer has been named president of the Kewanee Boiler Division of American Radiator & Standard Sanitary Corp. Mr. Palmer succeeds Wm. Bradford Russell, who is retiring from active service with the division but will continue to assist in a consultive capacity. Prior to his appointment, Mr. Palmer was executive vice president of the Kewanee Boiler Division. He began his career with the company in 1926.

• The national Red Feather Award for outstanding volunteer service to the nation's 1,900 United Funds, Community, Chests and Community Welfare Councils was presented to Albert J. Nesbitt, of Philadelphia, Pa., president of John J. Nesbitt, Inc., manufacturers of heating, ventilating and air conditioning equipment, Holmesburg, Pa. Nesbitt is the retiring president of Community Chests and Councils of America which gave the award at its national biennial conference in Detroit, Mich.

• Lawrence H. Hirschbach has been appointed manager of marketing for General Electric home heating and cooling. Mr. Hirschbach was formerly manager of builder and modernization sales. In the heating industry since 1933, he has served with the Fitzgibbons Boiler Co. of New York as sales representative; with Gibbs and Hill, New York, consulting engineers; and from 1950 to 1953 as an officer of Controlaire, Inc., G-E heating and cooling distributor of Fort Lee, N. J. He had served with General Electric from 1947 to 1949 and returned as manager of builder sales in 1953.

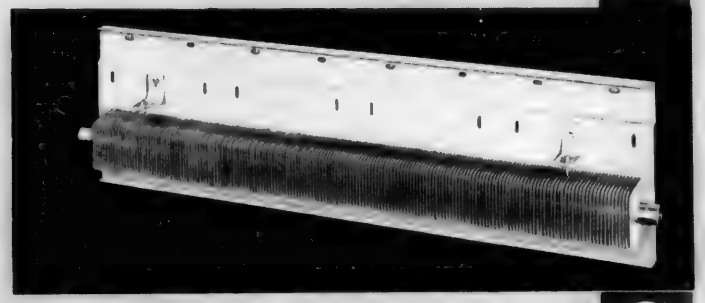
installing nesbitt sill-line...

1



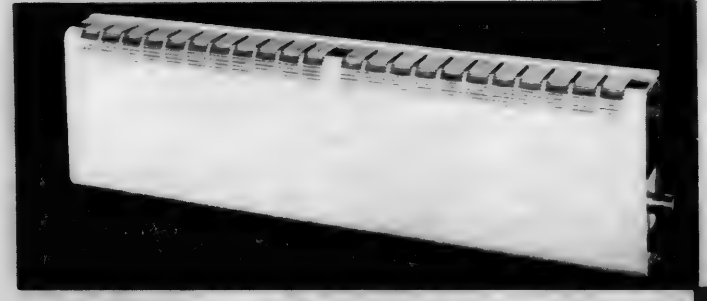
Erect the back panel. It is one true and rigid piece, formed of 20-gauge steel. It fastens to the wall or studding with a few screws and alines perfectly when butted to other sections. With seven lengths — 2 to 8 ft. — and sleeves, you may fit any wall to wall without cutting.

2



Suspend the heating element. There are eight types, with corrugated aluminum fins, offering a wide range of capacities, steam or hot water. The copper tube ends are sized-to-mate for easy sweat jointing, and the adjustable hanger brackets provide for pitch and expansion.

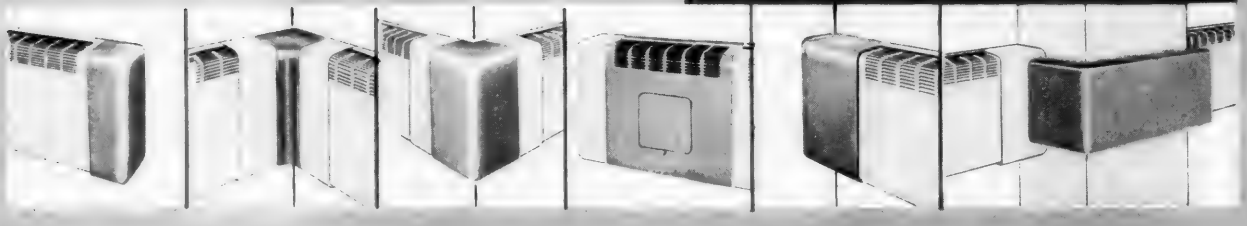
3



Mount the front enclosure. The die-formed 16-gauge front locks into back panel for full length support at top and bottom. Other accessories are added. One, two, three — and the world's most beautiful perimeter radiation is ready to bring comfort with economy to modern interiors.

Sill-line has every needed accessory for finishing short of wall, wall to wall, or around corners and columns. Ask for Publication 102.

Nesbitt
SILL-LINE RADIATION



Nesbitt Sill-line is made and sold by John J. Nesbitt, Inc., Philadelphia 36, Pa.
Sold also by leading wholesalers

Jenni Genetron says

"These are the Modern refrigerants for the Air Conditioned Age"

genetron®

Tested! Approved! For America's Finest Air Conditioning Equipment!

America moves into the air conditioned age. In houses and apartments . . . in stores and factories . . . in offices and public buildings, man-made weather is the order of the day, calling for air conditioning equipment of highest efficiency and economy.

"Genetron" Super-Dry Refrigerants are tailor made for such systems. They meet or surpass the industry's most exacting specifications for fluorinated hydrocarbon refrigerants. Leading manufacturers have tested them exhaustively . . . have approved and certified "Genetron" Super-Dry Refrigerants for original or replacement charge in America's finest equipment!

Moisture Out! Trouble Out!

The quality specifications on the opposite page tell why "Genetron" Refrigerants are so dependable. Note their exceptionally low moisture content, their very low percentages of non-condensable gases and high boiling impurities. Here are refrigerants that can be counted upon for trouble-free performance every time!

Stable! Safe! Nonflammable! Noncorrosive!

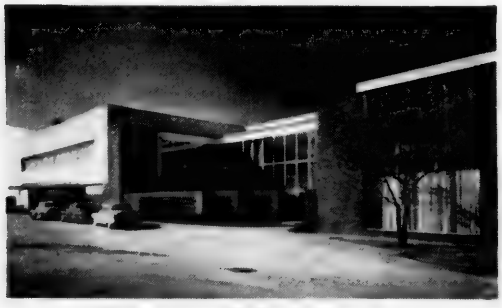
Always specify "Genetron" Super-Dry Refrigerants for your equipment. Learn for yourself why "Genetrons" are the "Modern refrigerants for the air conditioned age."

- **Super-Dry! Guaranteed exceptionally low moisture content**
- **Noncorrosive to standard equipment materials**
- **Nontoxic, nonflammable, stable, safe**
- **Critical and freezing points well outside range of operating uses**
- **Solvent action on oil helps prevent solidification or congealing of lubricant**
- **Miscible with oil; aid in lubrication of equipment**
- **Identical and freely interchangeable with comparable fluorinated hydrocarbon refrigerants made by any other manufacturer meeting the same high standards**

Extremely low moisture content! Exceptionally high purity!

For Homes and Offices of the Air Conditioned Age!

Super-Dry Refrigerants



For Stores and Public Buildings of the Air Conditioned Age!

For Factories of the Air Conditioned Age!

genetron 11 ORANGE LABEL

TRICHLOROMONOFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0010
Chlorides	none
High boiling impurities—vol. %, max.	0.01
Boiling pt. at 760 mm. Hg °F.	74.7
Boiling range °F (to 85% pt.), max.	0.5

USES

Trichloromonofluoromethane ("Genetron" 11) finds widespread use as a refrigerant in industrial and commercial air conditioning systems using single or multi-stage centrifugal compressors. It can also be used for either direct or indirect expansion-type systems.

genetron 12 WHITE LABEL

DICHLORODIFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0010
Chlorides	none
High boiling impurities—vol. %, max.	0.01
Non-condensable gases (gases insoluble in perchloroethylene)—vol. % in vapor phase, max.	1.5
Boiling pt. at 760 mm. Hg °F.	−21.6
Boiling range °F (to 85% pt.), max.	0.5

USES

Dichlorodifluoromethane ("Genetron" 12) and Monochlorodifluoromethane ("Genetron" 141) are the most widely used organic fluorine refrigerants. They are used in virtually all types of air conditioning equipment, large and small, household and industrial, direct and indirect expansion systems.

genetron 141 GREEN LABEL

MONOCHLORODIFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0010
Chlorides	none
High boiling impurities—vol. %, max.	0.01
Non-condensable gases (gases insoluble in perchloroethylene)—vol. % in vapor phase, max.	1.5
Boiling pt. at 760 mm. Hg °F.	−41.4
Boiling range °F (to 85% pt.), max.	0.5

Some of the typical units in which "Genetron" 12 and 141 are used: window air conditioners, home or office console units, large store units, large custom-built units for commercial comfort, large home units for addition to present hot air heating systems, and mobile units for transportation equipment.

genetron 226 PURPLE LABEL

TRICHLOROTRIFLUOROETHANE

Quality Specifications

Moisture wt. %, max.	0.0025
Chlorides	none
Boiling pt. at 760 mm. Hg °F.	117.6
Boiling range °F (to 85% pt.), max.	1.8

USES

Trichlorotrifluoroethane ("Genetron" 226) is used in 25-ton and larger centrifugal compressors, primarily for large comfort cooling systems, brine cooling systems, and other commercial and industrial air conditioning systems.

For further information, see your wholesaler
or call or write

genetron department

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Allied Chemical

Wherever you are, "Genetron" Super-Dry Refrigerants are as close to you as your telephone. Featured by Leading Refrigeration Wholesalers from Coast to Coast.

In new airport, B&G *Hydro-Flo*

circulates water for space heating and

At the new Milwaukee County Airport Terminal, mechanically circulated hot water is used to provide comfort for travelers and operating safety.

For space heating, water heated in B&G Steam Convertors is circulated through the system by B&G Booster pumps located at the convertor stations. The ticket and baggage concourses and part of the second floor employ radiant panels. Anti-freeze solution for the snow melting panels is heated and circulated by similar B&G equipment.

Hot water for service use is also heated in a B&G Steam Convertor and circulated through the system by a B&G Booster.

B&G circulating pumps are specifically designed to meet the exacting requirements of a satisfactory water system...*for either heating or*

B&G Type "SU" Heat Exchangers

The "SU" Heat Exchanger is an instantaneous type, designed to heat liquids with steam. No space-wasting, expensive storage tank needed. "SU" Exchangers are available with either 2 or 4 passes and cast iron or brass construction. Common applications include heating of service water, radiation, storage tanks, swimming pools and feed-water.

B&G Booster Pumps

Basically sound engineering, supported by precision manufacture, is the reason why the B&G Booster can show such a remarkable record for efficiency, dependability and long life. *Over 2,000,000 B&G Boosters have been sold to date!*

These pumps satisfy the all important requirement of *quiet operation*. Motors are either built in the B&G plant or to rigid specifications by leading motor manufacturers. The oversized shaft is of a special alloy...bronze, *sleeve-type* bearings, extra long to maintain the shaft in exact alignment and assure smooth operation. Add to this a leak-proof seal—positive protection against entry of water into the bearings.

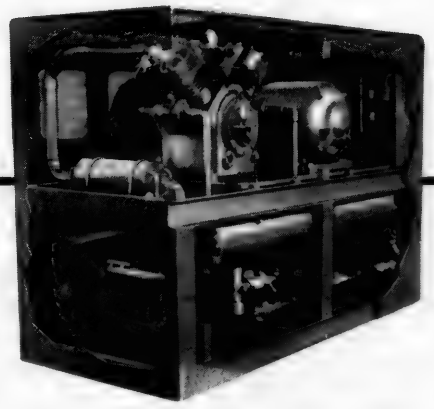
B&G Boosters are easily serviced. By removing a few bolts, the pump can be separated into three parts, permitting servicing without breaking pipe connections.

For pumping jobs having greater head and capacity requirements than covered by Boosters, the B&G Universal Pump offers the same *quiet*, dependable performance.

equipment heats and snow melting

cooling. And for the many applications where steam-to-water or water-to-water heat transfer is required, B&G Heat Exchangers provide large capacity in compact, efficient units.

Architect and Construction Superintendent: **John Messmer, Milwaukee, Wisconsin**... Assistant Construction Superintendent: **Fred Melms**...Electrical Engineer: **Gregory Pichel**...Heating Engineers: **Joseph H. Volk and William T. Holland, Milwaukee, Wisconsin**...Heating Contractors: **E. D. Wesley Co., Bon Heating Co., Wenzel and Henoch, Milwaukee, Wisconsin.**



B&G PACKAGE LIQUID COOLERS

Virtually a plug-in unit for a wide variety of applications...as a separate space cooler...or in combination with a forced hot water heating system...or for industrial processes requiring controlled cooling of materials. Available in capacities from 7½ to 100 tons.

Numerous features make the B&G Package Cooler an outstanding unit. Low pressure drop through the evaporator permits a substantial reduction in system pump sizes. The evaporator is located under the compressor for a lower center of gravity—making the unit easier to install and service. An integrated electrical control system provides a high degree of automation without extra cost. Completely wired, including chiller and tower pump.

Write for Bulletin HB-755.

*Reg. U.S. Pat. Off.

BELL & GOSSETT

COMPANY

Dept. EH-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, W. Toronto, Canada

Won't crack...won't peel...won't flake... EVER!

WHEELING

SOFTITE®

COP-R-LOY® GALVANIZED SHEETS

Wheeling

This is Wheeling's Richmond warehouse. Other Wheeling warehouses and sales offices are strategically located throughout the country. They all offer immediate delivery of warehouse-stocked Wheeling items such as SOFTITE Cop-R-Loy Galvanized sheets, Galvanized Furnace Pipe, snap lock or closed seam Perimeter Heating or Air Conditioning Pipe, and accessories.

Here's a galvanized sheet that can really be *worked* with never any fear of chipping or flaking. Why? Because it's ductile and tight coated, made on Wheeling's new continuous galvanizing line. Bead it, seam it, fold it . . . do anything you like . . . this coating will go anywhere, do anything the base metal will!

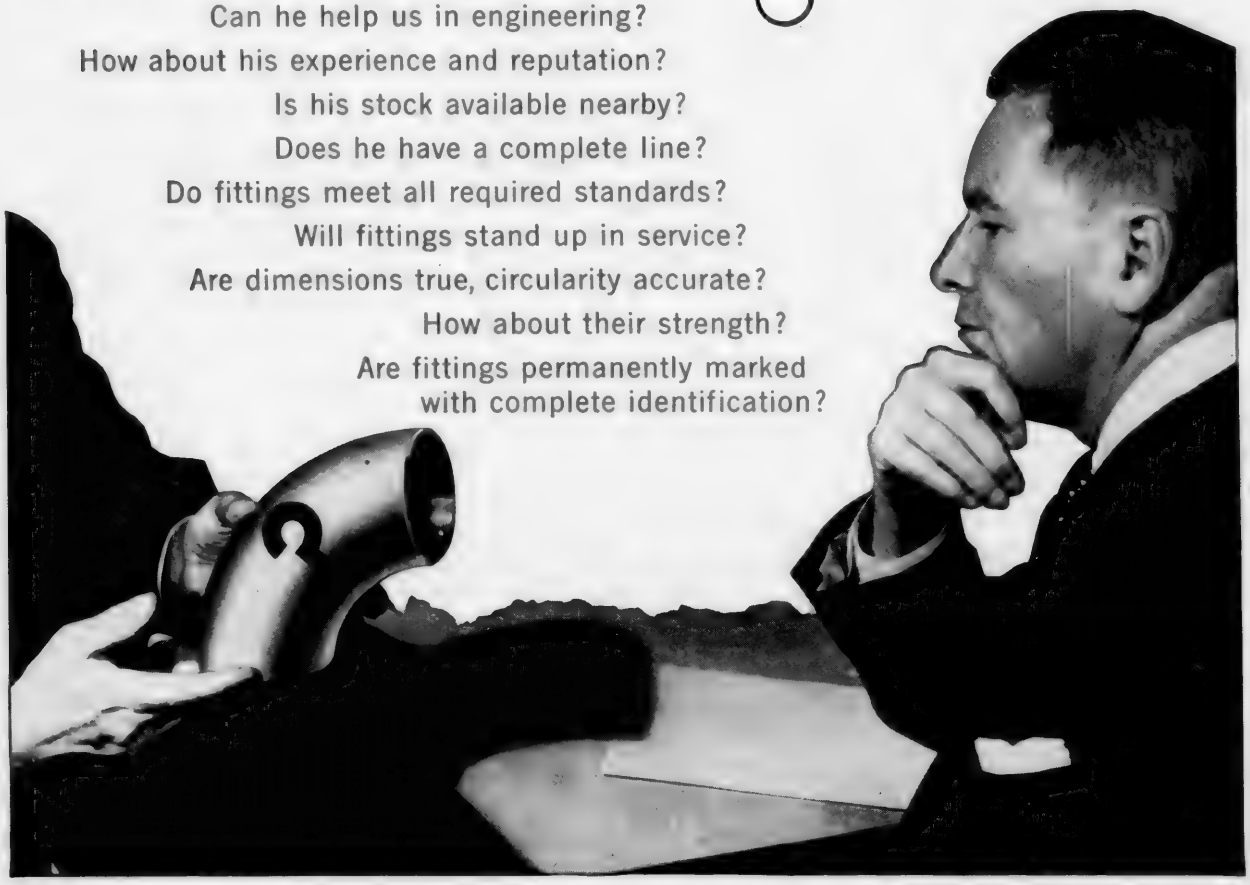
As a result, Wheeling SOFTITE Cop-R-Loy Galvanized Sheets give tighter joints, surer seams, longer spans. They make every job look better, last longer. Remember SOFTITE next time you order galvanized sheets. That's SOFTITE, made only by Wheeling. Get full details from the Wheeling warehouse or sales office nearest you!

WHEELING CORRUGATING COMPANY, WHEELING, WEST VIRGINIA

Warehouses: Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Minneapolis, New Orleans, New York, Philadelphia, Richmond, St. Louis. **Sales Offices:** Atlanta, Houston.

why run a risk with Question-Mark fittings

Is the manufacturer a piping specialist?
Can he help us in engineering?
How about his experience and reputation?
Is his stock available nearby?
Does he have a complete line?
Do fittings meet all required standards?
Will fittings stand up in service?
Are dimensions true, circularity accurate?
How about their strength?
Are fittings permanently marked with complete identification?



No unanswered question...no risk
when you buy known fittings

YOU SAVE purchasing time and avoid trouble later on when you buy TUBE-TURN* Welding Fittings and Flanges. Made in U.S.A. by the leader in the field, these products give you top quality and uniformity, backed by unmatched engineering service and nearby complete-line distributor facilities. They meet *all* American Standard and Safety Code requirements. Each product is permanently identified by the "TUBE-TURN" trademark with complete size and material designation. You can't get a better bargain in welding fittings and flanges than from your trusted Tube Turns' Distributor!

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

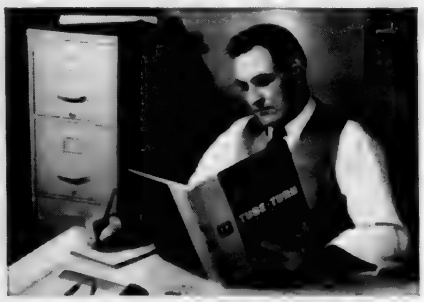
DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Detroit • Chicago • Kansas City • Denver
Los Angeles • San Francisco • Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

*"TUBE-TURN" and "TT" Reg. U.S. Pat. Off.

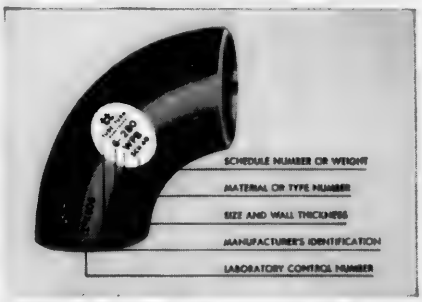
THE WELDER KNOWS he's getting the exact fitting specified on the blueprint because the fitting is clearly marked with all designations.

Complete...Permanent Identification!

THE STOREROOM WORKER KNOWS he is selecting the right fitting when it's marked "TUBE-TURN". The fitting bears complete information called for on the requisition.



THE DESIGNER KNOWS that his specifications will be carried out precisely where his drawings call for "TUBE-TURN products". At every stage . . . from purchasing to pipe installation, people KNOW what they're getting and using.



CLEARLY MARKED. TUBE-TURN* Welding Fittings are completely identified as to dimensional and metallurgical facts. Here is your assurance that you have the RIGHT fitting, and that it has passed Tube Turns' rigid inspection and quality control.

This is just *one* reason why you should specify the leading brand of fittings and buy from your trusted Tube Turns' Distributor.

TUBE-TURN Welding Fittings and Flanges are made in U. S. A.
They meet *all* U. S. piping code specifications.

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TUBE-TURN

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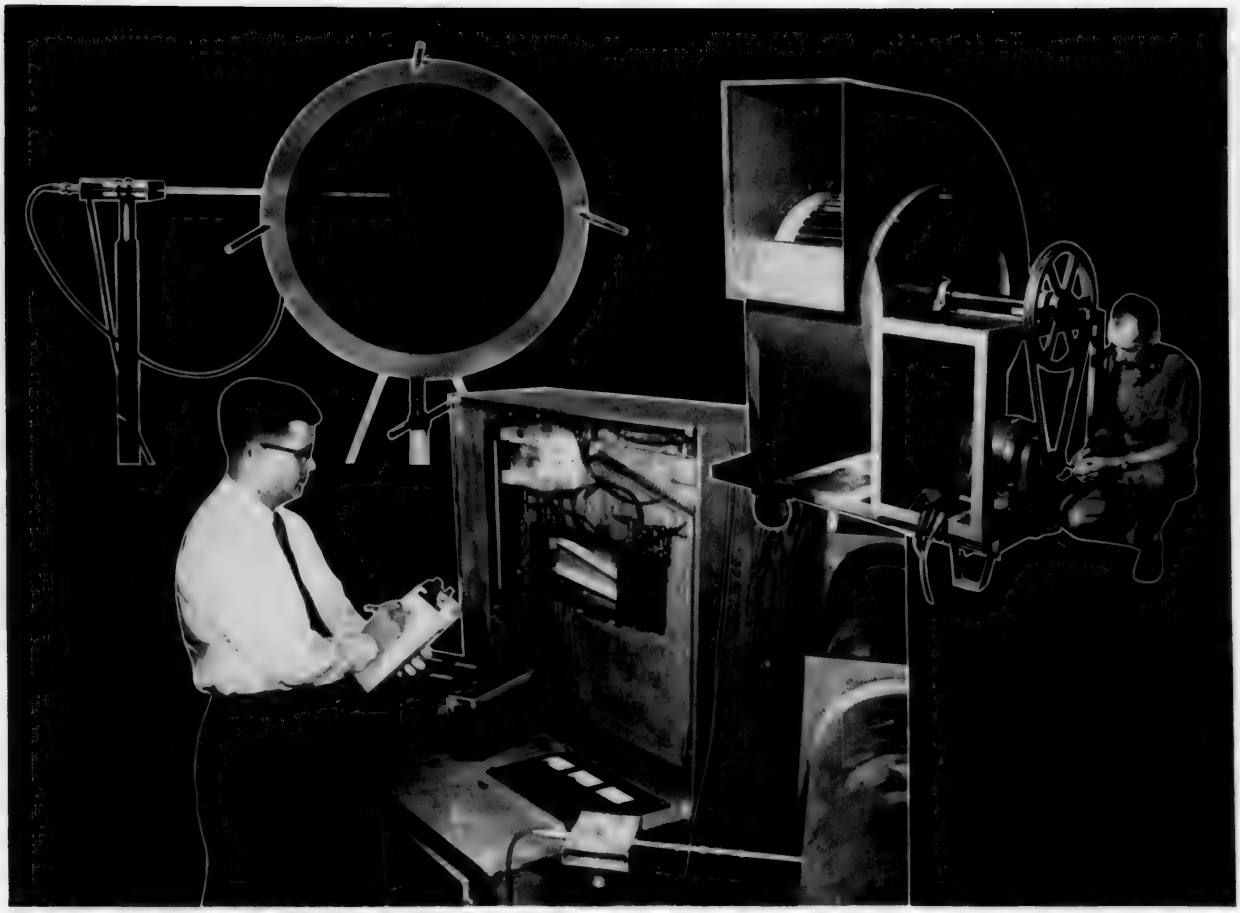

Peerless Development Engineer Richard Thompson (at control board) guides unit through development and George Goldner conducts final inspection.

VERIFIED BLOWER PERFORMANCE

● It just makes good sense to specify Peerless. Every fan or blower leaving our plant is unconditionally guaranteed to meet all established industry test codes (NAFM or PFMA). To an engineer, guaranteed performance means specifying without doubt—to a contractor it means good performance and no callbacks.

OUTSTANDING PERFORMANCE. The outstanding service records of Peerless fans and blowers stem from excellent design and thorough tests in every step of development and manufacture. A minimum of eight, 20-point determinations are made during the development period alone.

100% INSPECTION. Every unit (including the job-matched Peerless custom-built motor) receives 100% inspection before it leaves our plant. Wheel alignment and lubrication are checked . . . variable pitch pulleys are adjusted to correct motor RPM for exact CFM . . . angle of discharge is set . . . each unit is ready to go when you receive it.

COMPLETE LINE. There is a Peerless fan or blower for virtually every application. Complete data is catalogued for easy reference. Peerless Bulletin SDA-160 shows fans and forward curve blowers. Bulletin SDA-200 gives complete data on backward curve blowers (NAFM) from 12½" to 36½". These two bulletins will help you solve most air-moving problems. To get your copy, use the coupon below. Dimension prints are available on request.

FAN AND BLOWER DIVISION

Peerless Electric **THE PEERLESS ELECTRIC COMPANY**

1405 W. MARKET ST. • WARREN, OHIO

FANS · BLOWERS · MOTORS · ELECTRONIC EQUIPMENT

THE PEERLESS ELECTRIC CO.

WARREN, OHIO

☐ Send me Bulletin SDA-160.

☐ Send me Bulletin SDA-200.

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Aquatowers®

WITH

MarClad

THERMO-SETTING PLASTIC

... for a Long Life and a happy one!

It's a happy day for you and your customer when you install a '56 Aquatower with new MarClad finish because it's packed with more eye appeal and designed to give longer service than any other packaged cooling tower!

MarClad is a two-coat, high-temperature baked plastic finish that resists rust and corrosion . . . defies the attack of acids, alkalis and water. MarClad protects Aquatowers from damage in storage, on their way to the job and during installation . . . and insures that they will last to a ripe old age. What's more, MarClad's soft gray color lends that compatible look that is so pleasing to owners.

From start to finish, '56 Aquatowers are a better buy than ever before. Back of each tower stands the Marley reputation and guarantee that protects you, as well as the owner. With each tower comes complete "how-to-do-it" installation instructions to make your job easier. Write today for the latest literature, or see your Marley supplier in any major city.

"Nothing cools as well as water . . . nothing cools water as well as a Marley Cooling Tower"

MARLEY

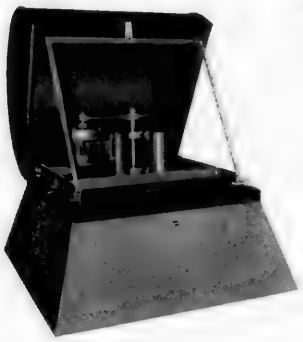
The Marley Company

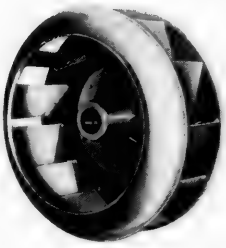
Kansas City, Missouri

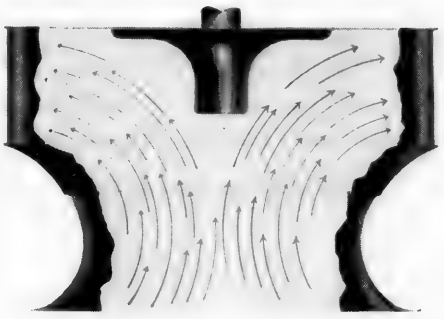
The MASSACHUSETTS

POWER ROOF VENTILATORS* (POWER FIXED TYPE)

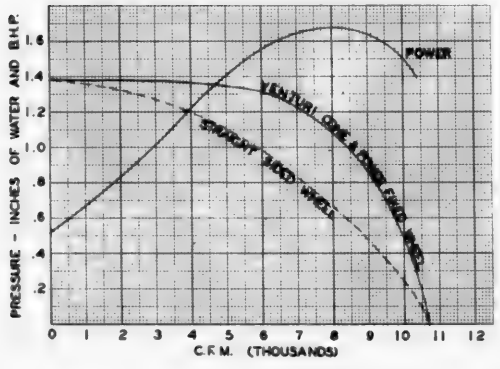
*IMPROVED DESIGN







The above diagram illustrates air flow through the streamlined inlet cone section and spun wheel cone of MASSACHUSETTS Power Roof Ventilators. Note the overlap of wheel and inlet cone, allowing no loss of air and efficiency at this point, and no turbulance. LOOK FOR THIS FEATURE when buying or specifying Power Roof Ventilators.

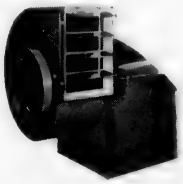


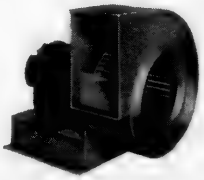
Test conducted in Bishop & Babcock Laboratory on a 30 inch Centrifugal Power Roof Ventilator at 685 R.P.M. Solid line represents Massachusetts design employing full venturi inlet cone and Power Fixed or spun cone type wheel. Dotted line represents air delivery of unit employing a straight sided wheel and short inlet cone.

Write for Catalog Bulletin No. 124 for complete data on 13 sizes, belt driven, 15" to 59½" and direct driven type.

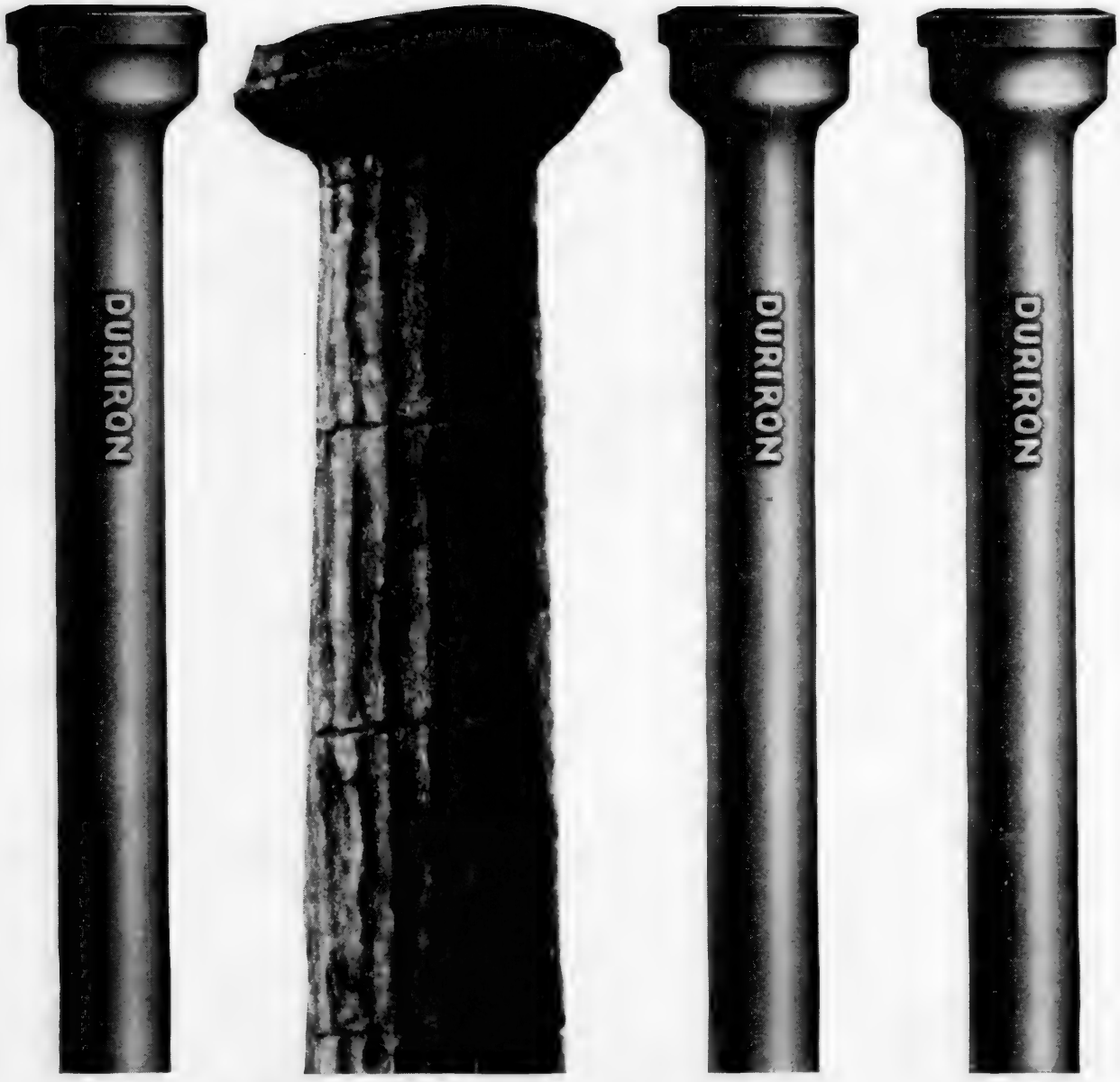
UTILITY TYPE VENTILATING SETS

Both belt drive and direct drive available in popular competitive sizes, self-contained completely packaged units. Write for Catalog Bulletin No. 109.





The BISHOP & BABCOCK Mfg. Co.



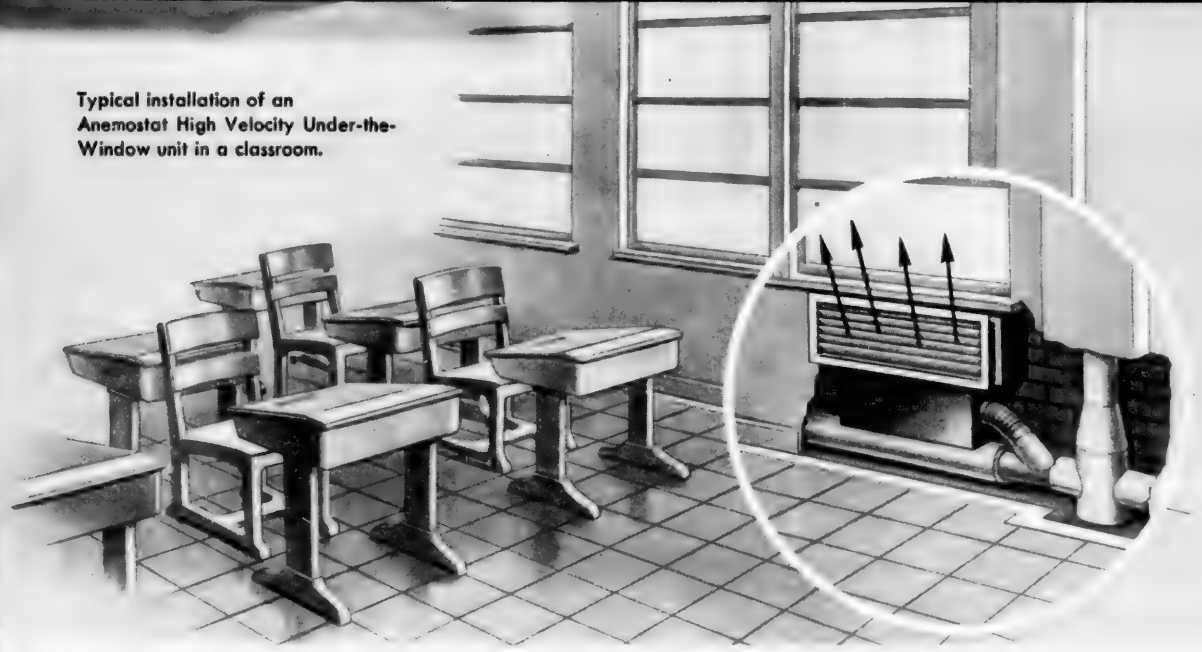
SYMBOLS OF PERMANENCE

DURIRON® ACIDPROOF DRAIN PIPE

Duriron generally will outlast the building in which it is installed. Duriron resists practically all commercial acids and other corrosive solutions. Duriron is the one high silicon iron pipe specified for more than 30 years by architects and engineers for corrosive waste disposal systems. A complete line of Duriron pipe and fittings is stocked by leading wholesalers throughout the country.

THE DURIRON COMPANY, INC., DAYTON, OHIO

DURIRON
LOOK FOR THE NAME ON EVERY PIECE



Typical installation of an Anemostat High Velocity Under-the-Window unit in a classroom.

How to deliver

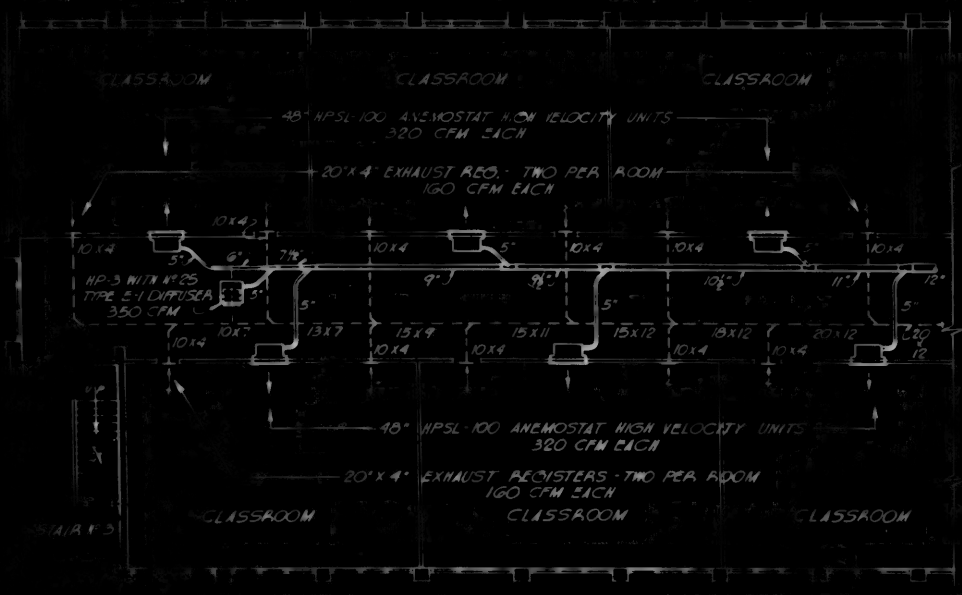
high velocity air to schoolrooms

Shown here are two ways of using the Anemostat All-Air High Velocity system of draftless air distribution for heating and ventilating schools. Under-the-Window units (above) are the most practical for colder climates. Corridor distribution (below) is preferable in warmer climates.

Advantages:

- All-Air High Velocity units require smaller than conventional ducts, thus save space and money.
- All-Air HV units can be used for individual or zone control, in single or dual duct installation.
- Since air is supplied from the main equipment room, there is no need to break through the outside of the building for prime air make-up. This eliminates grilles, dampers, possibility of leaks.
- The Anemostat All-Air HV system can be simply installed by the sheet metal trades. No supply or return pipes are required. Units are quiet, need a minimum of maintenance from custodians.

For latest data on All-Air High Velocity units, write on your business letterhead for new Selection Manual 50 to Anemostat Corporation of America, 10 E. 39 Street, New York 16, N. Y.



Diagrammatic layout shows corridor distribution of high velocity air for wing of school.

Random Thoughts from a Filter Engineer

by George F. Parker

- **COMMON DISEASES OF FILTERS**
- **KEEPING FILTERS ON THE JOB**
- **GREASE FILTERS AND U. L. APPROVAL**

COMMON DISEASES OF FILTERS

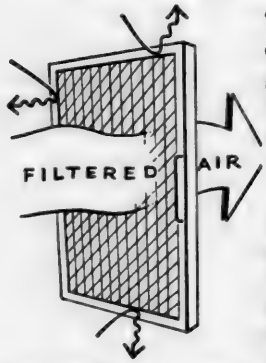
It's unfortunate that the full efficiency and protection built into a filter can't be realized unless the user cooperates. No matter how successful the filter manufacturer is at extending the service period, there still comes a time when some service is necessary. Improper maintenance is the most common disease filters suffer from.

We've tried to analyze why filters aren't treated better. And we think a part of the answer lies in the fact that people can't readily understand that filters will save money if kept clean. On a bearing for instance, it's easy to see the connection between proper maintenance and reduced costs. Improper lubrication reduces efficiency and shortens life. But with an air filter it's different. Filter users don't have to buy air. They figure it's free. And they're not as quick to realize that if filters aren't cleaned, dirty air gets through and that *does* cost money.

We try to make filter maintenance as easy as possible for the user. For example, for those who buy our washable viscous panels, we have available washing tanks, spray nozzles, cleaning compounds, and water-soluble adhesives. Our Automaze and Electromaze filters offer automatic servicing over long periods of time.

Both user and equipment manufacturer alike will insure better air filtration if they will give more recognition to the need of periodic inspection and service of air filters. Even the best filter can't function properly unless it is properly maintained.

KEEPING FILTERS ON THE JOB



Air-Maze Holding Frames and Gaskets Stop By-Pass

There's one aspect of filter engineering that we seldom get around to talking about—filter accessories. Yet they also need and get the same careful engineering that our filters get.

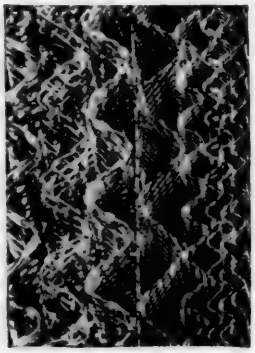
Take panel holding frames for instance. The four corners are made to present a smooth surface for better sealing. Die-stamped spacer buttons at bottom of the frame insure centering of filter on all four sides. Instead of the usual felt gasket, we furnish one of sponge neoprene that is oil resistant, lasts indefinitely, won't take a permanent set, doesn't support combustion.

To provide even, positive pressure between filter and gasket, we offer a choice of adjustable spring clips, cam-type locking clamps or spring-loaded clamps to fit your particular need or price.

Any one of these features is important in assuring better filter performance. Together, they offer a real plus value that helps to make the difference between Air-Maze and any other filter.

GREASE FILTERS AND U. L. APPROVAL

A clever (?) device used by some manufacturers to infer that their grease filters have U.L. approval goes like this: They secure U.L. approval on a filter used for ventilating air. They then say that "this panel is also designed for use as a grease filter". Voila! The obvious conclusion is that the filter is U.L. approved for grease applications.



Cross-Section, Greastop

Unfortunately, the U.L. has no classification for grease filters. Even our Greastop filter (one of the best), which is made expressly for kitchen range canopy installations, does not carry the Underwriters' label. The Greastop filter is engineered for a specific job. It has heavy galvanized steel wire mesh on the approach face to resist flash grease fires and to stop lint and bulky material without obstructing air flow. The fine wire mesh downstream is specially plated to resist corrosion by the fatty acids in grease.

AFI MEMBER AIR FILTER INSTITUTE

Even though Greastop does not carry the U. L. label, we think you'll find, like many thousands of others, that it offers effective protection. The Air-Maze Corporation, 25000 Miles Rd., Cleveland 28, Ohio.

AIR-MAZE

The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

Cincinnati Public Library

Architects: WOODIE GARBER & ASSOCIATES
Associated Architects: SAMUEL HANNAFORD & SONS
Mechanical Engineers: WM. E. BODENSTEIN & W. W. SHUSTER
Htg. and Air Cond. Contractor: PECK-HANNAFORD & BRIGGS CO.

Ideal Comfort in this

Department Store of Knowledge

Is Assured by **POWERS** *Year 'round Air Conditioning Control System*

Cincinnati now has one of the nation's most colorful and attractive contemporary libraries. It is fully air conditioned.

Some of the Library's many features are: a children's room with child's size furniture, also a story hour room; film and recording center; a rare book room and director's room with stainless steel operable louvers on the exterior; rooftop terrace with planting boxes and reflecting pools; ground floor has a garden, pool and parking lot.

As modern as the building itself, is the Powers individual space control system which assures these important benefits: Maximum thermal comfort and fuel savings; low operating and maintenance cost; 25 to 40 years of reliable control with a minimum of repairs often reported by users.

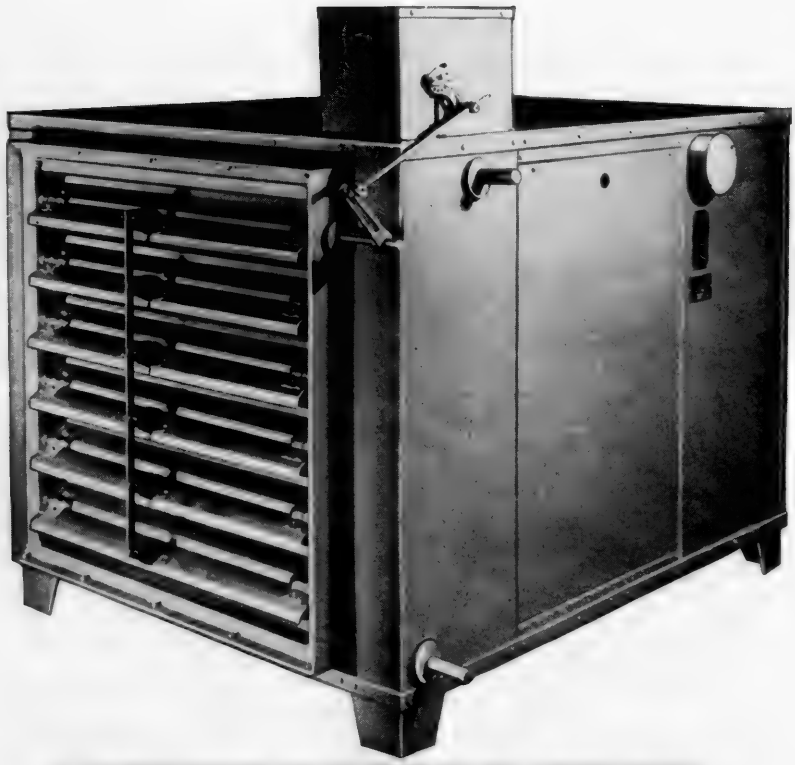
Consult Powers on your temperature and humidity control problems. Experience gained here and in thousands of other significant buildings may be helpful to you.

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 Years of Automatic Temperature and Humidity Control

(c61)



Now... Better Year 'Round Refrigeration

NEW MARLO AIR COOLED CONDENSERS

Offer

- **Fully automatic control of refrigerant flow**
- **No Water Needed**
- **Convenient, outdoor installation**

By maintaining liquid pressure in refrigerant lines for proper flow through lines and valves, the new Marlo Air Cooled Condensers permit full capacity operation of refrigeration units at all seasons.

The modulating sensing control device for controlling may be located either in the air stream or in a high side liquid line.

Propeller and Centrifugal Fan Types with full capacity performance and realistic ratings.

Write for Bulletin 5155. You may contact Marlo Representatives, located in principal cities, or our factory.

MARLO coil co.

SAINT LOUIS 10, MISSOURI

Quality Air Conditioning and Heat Transfer Equipment Since 1925

Mount Assisi Academy, Lemont, Illinois. Leo Strelka, Architect

Now every classroom and office can be comfortable

Iron Fireman SelecTemp heating has

A THERMOSTAT IN EVERY ROOM

The *ultimate* in heating comfort—*a thermostat* in every room—is both simple and practical with the Iron Fireman SelecTemp heating system. Occupants of each classroom or office can select any temperature desired, at any time. Rooms stay at the selected temperatures. SelecTemp units automatically compensate for heat gains and losses caused by changes in outdoor temperature, cold winds and warmth from the sun—increasing or decreasing heat output.

SELECTEMP HIGHLIGHTS

THERMOSTAT IN EVERY ROOM. Temperatures can be varied in every room to fit the "activity plan" and personal preference of the occupants.

MODULATED HEAT. Air circulation is continuous. Both temperature and volume of air are automatically modulated, as required to offset heat loss from room.

FILTERED, CIRCULATED AIR. Individual room air circulation prevents transmission of odors or bacteria from other rooms. Air is cleaned by a spun glass filter in each room unit. Filtered outside air can be introduced if desired.

BOILER LOCATION. Boiler can be placed in any desired location, with proper distribution of heat to every room. Year-around domestic hot water coils available.

LOW POWER COST. No electricity required to operate circulating fans. Nonelectric thermostats.

LOW INITIAL COST. Easily installed in either new or old construction. Small soft copper tubing (¼ inch I.D.) carries steam to individual room heater units. Return lines are ⅛ inch. Substantial savings in installation costs.

LOW FUEL COST. Temperature easily reduced in unused rooms. Overheating is eliminated. Fuels: Oil, gas or coal. Ideal for use with Central District steam.

AUTOMATICALLY BALANCED. No special adjustments of dampers, valves or orifices required to balance heating system. Each unit continuously regulates heat needed for each room. Automatically compensates for external heat sources such as fireplace or solar heat, without affecting temperatures of other rooms.

ECONOMICAL INSTALLATION AND OPERATION

Regardless of the type or size of structure; school, office building, hotel or apartment house, hospital, or house . . . SelecTemp heating can be economically and efficiently installed. Flexible copper tubing, smaller than your little finger, carries low pressure steam to each room unit.

In addition to individualized heating comfort SelecTemp brings substantial operating savings. The fuel waste resulting from overheating (symptom: occupants open the windows), and the unnecessary heating of unused space, is eliminated. A fan in each room unit, operated by a steam turbine, continuously circulates filtered warm air. No electricity is used for fans or thermostats.

ASK FOR FULL INFORMATION

Before choosing a heating system for any building or residence, whether new construction or being modernized, it will pay you to get the facts about the Iron Fireman SelecTemp—a completely new concept in heating practice. Just mail the coupon or write.

Iron Fireman®

SelecTemp®

MODULATING ZONE HEATING

For every size and type of building—Hotels, Motels, Apartment Houses, Schools, Churches, Office Buildings, Institutions, Hospitals.

Send for free booklet

IRON FIREMAN MANUFACTURING CO.
3036 West 106th Street, Cleveland 11, Ohio.
In Canada, write to 80 Ward Street, Toronto, Ontario.

Send literature on Iron Fireman SelecTemp heating.

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How to kill three duct problems

with one insulation . . .

Thermal, acoustical and vapor barrier problems are "dead ducks" when you use ULTRALITE*, the long glass fiber insulation. Here's why: Due to its unique long glass fiber composition, ULTRALITE is the toughest, most resilient glass fiber insulation on the market, with a record of ten years of successful application. Because of this extra strength, it can be adhered to sheet metal and run through the brakes and shears at the same time the ducts are formed — without worry that it will tear, compress, or delaminate.

Ducts formed in this way are *completely insulated units*, ready to install on the job. They solve the noise problem without impairing the efficiency of the unit because ULTRALITE Duct Liner has a low air friction coefficient. The same insulation that soaks up objectionable sound also insulates the ducts against heat gain or loss. *No vapor barrier is necessary;* with the insulation on the *inside* of the duct, the duct itself becomes the vapor barrier.

Try this time-saving new method on your next job, and you'll be delighted with both cost and performance. But be sure to use ULTRALITE — the only flexible glass fiber insulation with a 10-year record of successful performance.

*Reg. U. S. Pat. Off.

NOTE

Should you continue to wrap ULTRALITE around the exterior of ducts for thermal protection, be sure to line the plenum and short supply and return ducts with ULTRALITE Duct Liner. Do so even on jobs where duct liner is not specified, and you will be well repaid, for this will make all the difference between an enthusiastic and a dissatisfied customer.

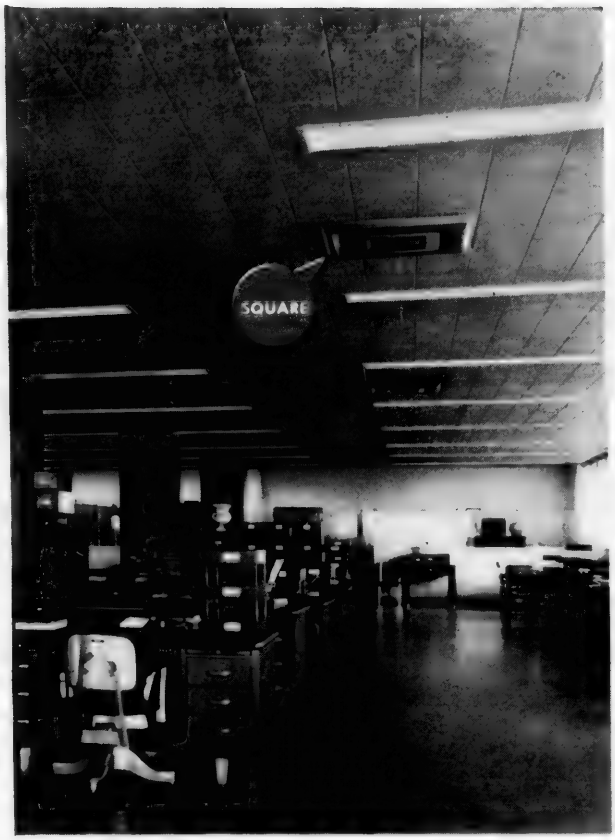
ULTRALITE is stocked locally in 57 cities. Your nearby distributor is listed in the Yellow Pages under "Gustin-Bacon Insulations."

GUSTIN-BACON *Manufacturing Company*

GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe coverings and fittings • Railroad gaskets and supplies

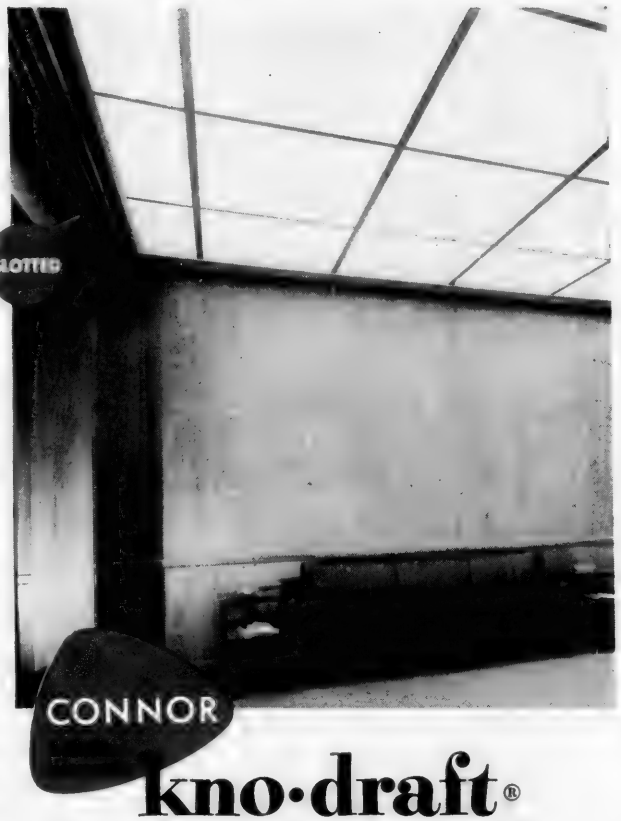
222 W. 10th St., Kansas City, Mo.



Announcing

the kno-draft "ARCHITECTS' GROUP"

Square and Slotted Series Air Diffusers



kno·draft®

Square and Slotted Air Diffusers

Architects and engineers now have wide new latitude in selecting air conditioning outlets. The addition of this "Architects' Group" of square and slotted units to the famous line of round Kno-Draft Air Diffusers offers the industry's most complete line of engineered diffusers.

Kno-Draft Square Diffusers (Series KP): Two models, eight sizes. Neck diameters from 4 to 14 inches. Capacities from 50 to 1250 cfm. Sturdy pressed steel construction. Available, with or without patented sleeve damper or anti-smudge frame, for overlap installation in acoustical or plastered ceilings; or snap-in installation in T-bar ceilings. All units geometrically proportional so that, at constant neck velocities, static pressure is same for all sizes. Precise, *circular* diffusion patterns over large area assured.

Kno-Draft Slotted Diffusers (Series KLS): Two models. (1) Adjustable one-directional flow for offices, board rooms, etc. (2) Completely adjustable multi-directional flow for larger areas such as lobbies and auditoriums. Handsome extruded aluminum construction. Modules of 2, 3, 4 and 6 feet can be installed singly or butted in series to form continuous diffuser line on ceiling or wall. Exclusive Kno-Draft adjustable air direction vanes permit discharge pattern to meet individual job needs. Grid-type volume control damper permits easy system balancing. Damper grids equalize air distribution over length of diffuser.

For complete performance and selection data on the new "Architects' Group" of Kno-Draft Square and Slotted Diffusers, simply clip coupon to your letterhead and mail to Connor Engineering Corporation, Danbury, Connecticut.

CONNOR ENGINEERING CORP.

Dept. J-46, Danbury, Conn.

Please send free copy of your Bulletin K-27 describing the "Architects' Group" of Kno-Draft Square and Slotted Air Diffusers.

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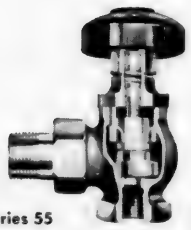
Heating Systems

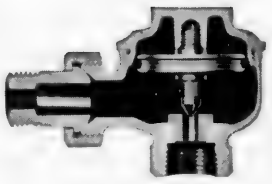
To the architect and engineer an Illinois Control System of Steam Heating means lasting client satisfaction; to the heating contractor, simplicity and ease of installation; to the owner, a sound investment in comfort, convenience and fuel economy.

Illinois Control Heating Systems are found in schools, hospitals, churches, apartments, commercial and public buildings of every type from coast to coast. They are offered in five types, and cover the complete range of vacuum and vapor heating requirements.

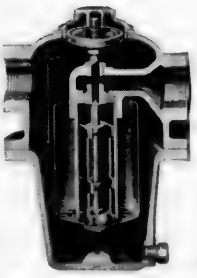
Consult the representative nearest you in our nation wide service.



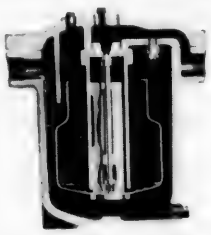
Series 55
Radiator Valve



Series G
Radiator Trap

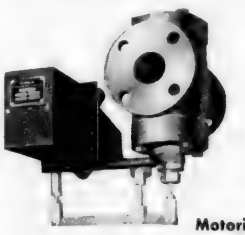


Float and
Thermostatic
Trap

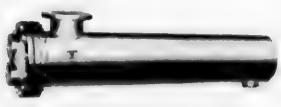


Series 35 Steam Trap

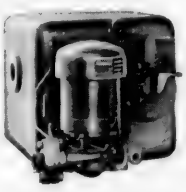
Pneumatic
Zone Control
Valve



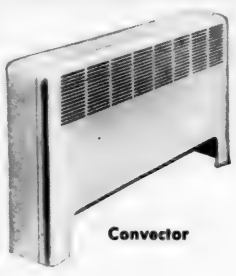
Motorized
Zone Control Valve



ASU Heat Exchanger



Condensation Pump



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Illinois Heating System Specialties

Installing Illinois Specialties, either in new projects or to replace present worn equipment will insure maximum service and economy. Illinois systems are scientifically balanced. All specialties are of our own manufacture, designed for coordinated operation. Manufacturing a complete range of devices enables us to select those that will give the desired results under the most exacting and widely varying requirements.

Illinois Power Specialties

In addition to the equipment illustrated there is also a complete line of power specialties—for medium and high pressures.

No matter what your problem in the handling or control of steam and condensate may be, we will be glad for the opportunity to discuss it with you.

Write for bulletins

illinois ENGINEERING

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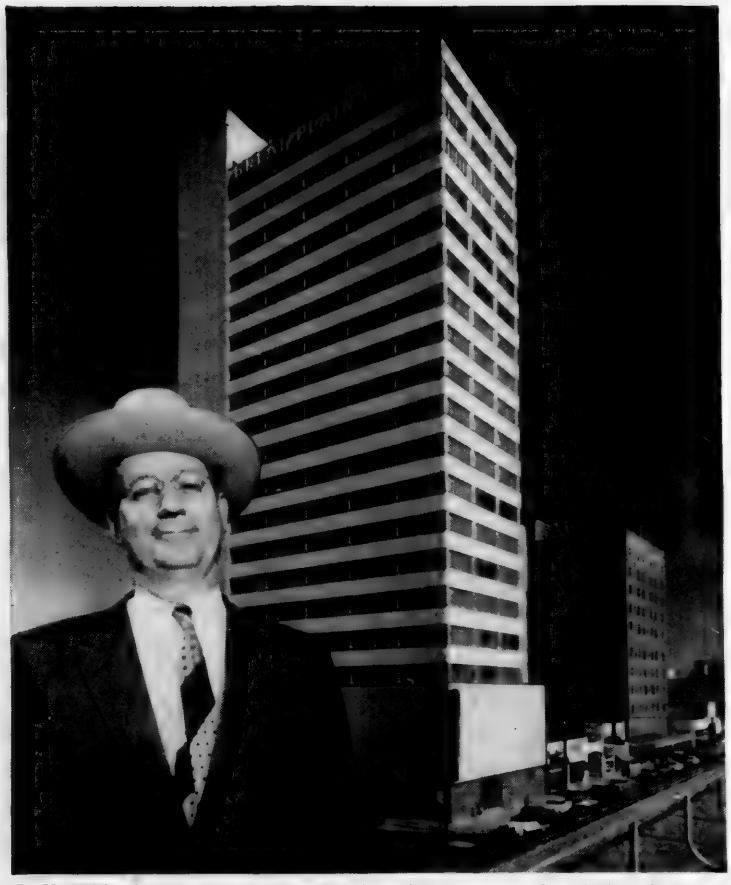
DIVISION OF AMERICAN AIR FILTER COMPANY, INC.



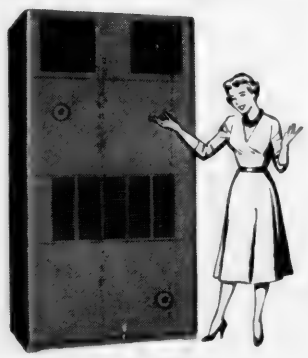
C. K. Whiteside, President, Great Plains Life Insurance Co., Lubbock, Texas

Architect: David S. Castle.
General Contractor: BMFP Construction Co.
Mechanical Contractor: Beals Plumbing and Heating.
Consulting Engineer: Leonard E. Kanto.

With 155,453 sq. ft. of floor space, Great Plains Life Building offers the ultimate in air conditioned comfort for a variety of tenants – including dentists (above, one of several), doctors, oil-exploration offices, a bank, a radio station (below), and a restaurant.

In Texas, even a day's temperature change can be BIG!

Requiring heating in the morning and cooling by midafternoon, Great Plains Life Building depends on American Blower equipment



In addition to equipment for complete central systems – American Blower offers packaged air conditioners for offices, stores, industrial plants, and similar applications.

Heating and cooling on the same day? That's what American Blower air conditioning equipment provides in the new 20-story Great Plains Life Insurance Building, Lubbock, Texas. For, on some days, outdoor temperatures jump from 25° F. in the morning to 82° F. by midafternoon!

Using American Blower multi-zone units, each floor is divided into four air conditioning zones . . . which can be controlled separately to allow individual comfort levels for tenants.

And despite occasional sand storms –lasting from one to three days, with winds up to 70 mph – the indoor atmosphere always remains fresh and clean, for it is filtered, conditioned, and distributed at over 220,000 cu. ft. per min.

Why not investigate American Blower equipment, if air conditioning is in *your* plans? A call to our branch office near you will bring helpful information, and the assistance of American Blower engineers.

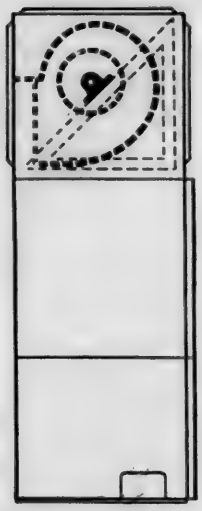
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American-Standard

AMERICAN 75th ANNIVERSARY YEAR **BLOWER**

Air conditioning equipment for every business

Here's an Economical and Efficient Improvement

for Air Conditioning Equipment . . .



FEATURES

Two-piece, pressed steel housing . . . occupies less space than similar pillow block housings.

Precision ball bearing, Fafnir Extended Inner Ring Type, offers extra wide bearing surface on shaft. Balls and races are finished for super-quiet performance.

Self-locking bearing collar of counterbored, mated-cam construction. Needs no lock washers, adapters, or other positioning devices.

Plya-Seals provide positive retention of lubricant and complete protection against contaminants. Special lubricant pre-packed at factory contributes to quietness of operation.

Thick, electric-current-conducting rubber interliner eliminates the need for metallic grounding springs or clips.

Six-page bulletin on all Fafnir Air Conditioning Units provides detailed information including dimensions and load ratings.

Specifically designed for air conditioning units with fan shafts up to an inch in diameter, the Fafnir RPB Type Ball Bearing Pillow Block offers an inexpensive way to improve performance, increase sales appeal. It has been adopted as standard equipment by several manufacturers. Actual installations are demonstrating its advantages.

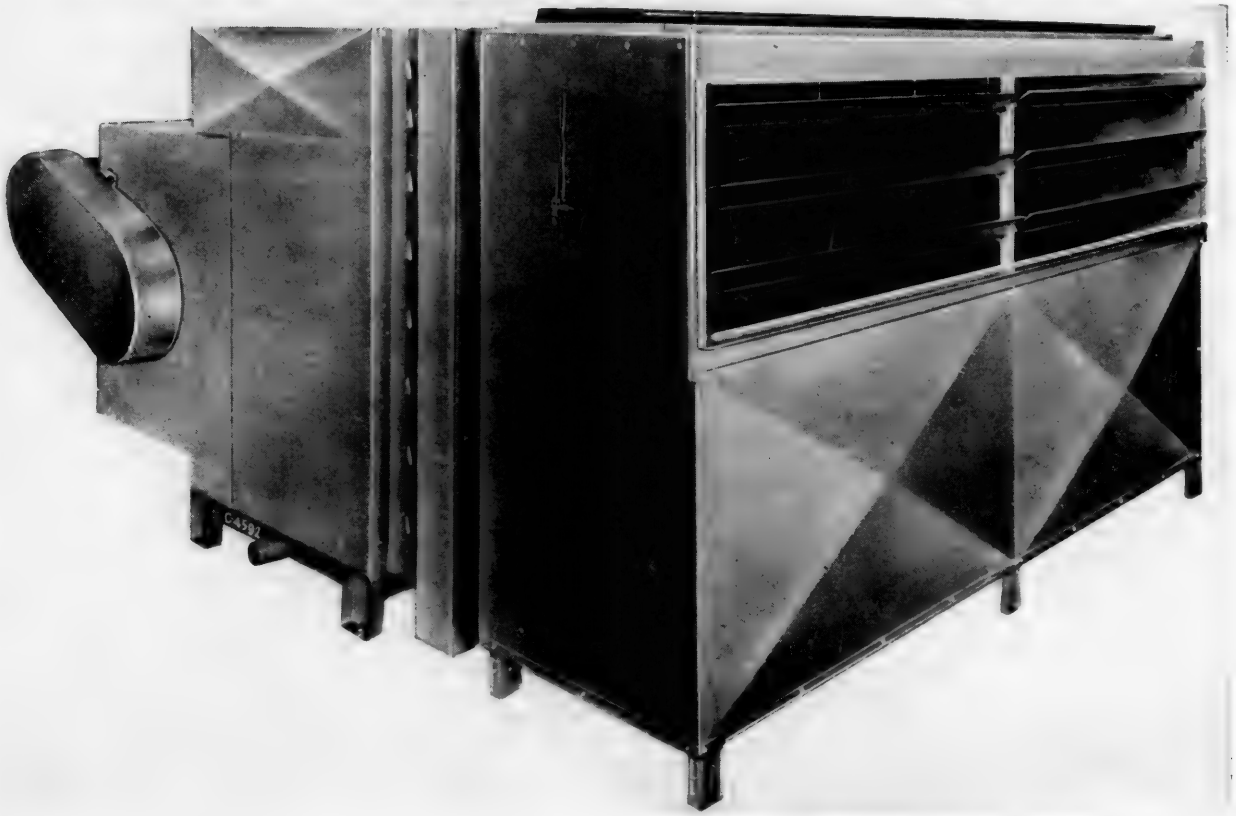
Next to super-quiet, trouble-free performance, manufacturers are most impressed with the easy installation of RPB units. The bearing slip-fits onto shaft and is positively locked to it by a quarter turn of the famous Fafnir self-locking collar. The housing is installed with two bolts. It affords unrestricted initial alignment in all directions. For more information on the RPB unit and other Fafnir super-quiet ball bearing units designed specifically for air conditioning and heating equipment, write The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR

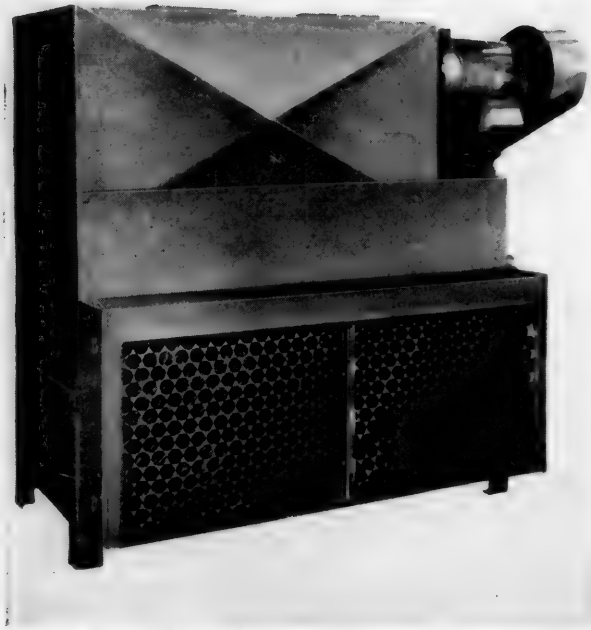
BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

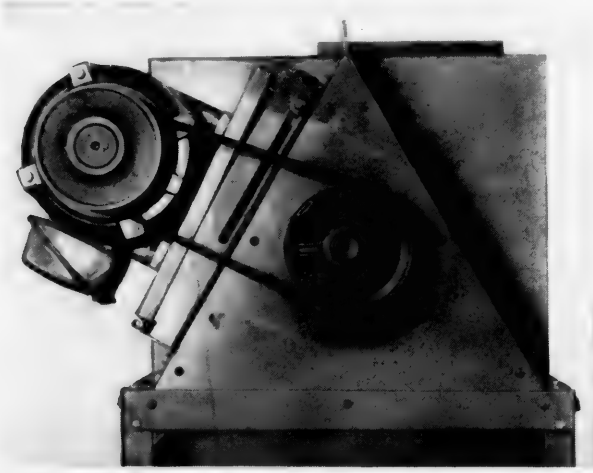
Announcing Worthington's



HORIZONTAL CONSTRUCTION of new Worthington air handling units allow them to be suspended from platform or ceiling (with hanger lugs.) Here is a large sized unit with damper section. Standard unit consists of fan section, fans, V-belt, drive (with variable pitch pulley), bypass and damper section, direct expansion or chilled water coils, and base section.



SMALLER SIZED UNITS are shipped completely assembled for horizontal or vertical arrangement shown above.



ADJUSTABLE MOTOR BASE, exclusive with Worthington, offers a 3½" variation in center distance. Adjusted with a single screw, a locking bolt secures base in proper position. This feature assures positive adjustment, enables you to keep belt tension correct. Belt turns on an adjustable pitch pulley which permits variation of fan speed and air quantity.

complete new line of flexible air conditioning units

Compact units—from 1½ to 106 tons—are easy to install—have many exclusive features

Here's a new line of unusually compact air conditioning units for commercial and industrial use in conjunction with central system air conditioning.

Designed by Worthington for easy installation, the standard unit consists of a base section, fan section and coil section. A bypass and damper section can be bolted directly to the coil face at the factory if desired, adding no height to the unit.

Units are extremely flexible. The fan section may be mounted with front, top or rear discharge. You can adjust speed for desired capacity and static pressures. Adjustable motor base offers 3½" variation in center distance for positive adjustment of belt tension. The motor mounts on the front, top, back or either end. Accessories are interchangeable between horizontal and vertical units.

Engineered by Worthington for long, trouble-free life, all sections are constructed of rugged fabricated steel. Bonderized and coated with a corrosion resistant enamel. Dynamically balanced, forward curved fans give maximum efficiency, quiet operation. (Fan shaft rides on lubricated-for-life bearings.)

For more facts on this new line of air conditioning equipment, write Worthington Corporation, Air Conditioning and Refrigeration Division, Section FO, Harrison, N. J.

These features add up to flexibility

- **Exclusive** adjustable motor base assures simple, positive adjustment of belt tension.
- **Motor mounts** on front, back or either end of unit.
- **Fan discharge** can be front, top or rear, as you prefer.
- **Accessories interchangeable** between the horizontal and vertical units.

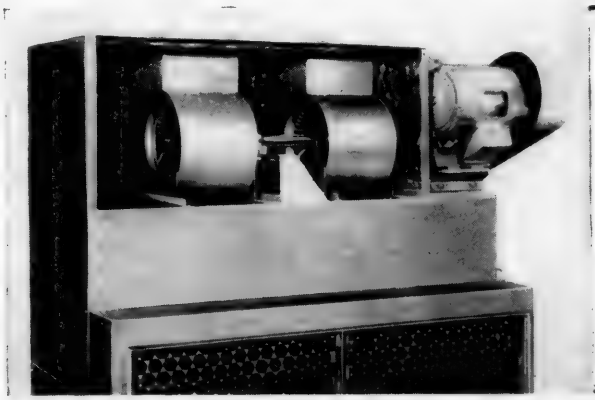
And look at these extras!

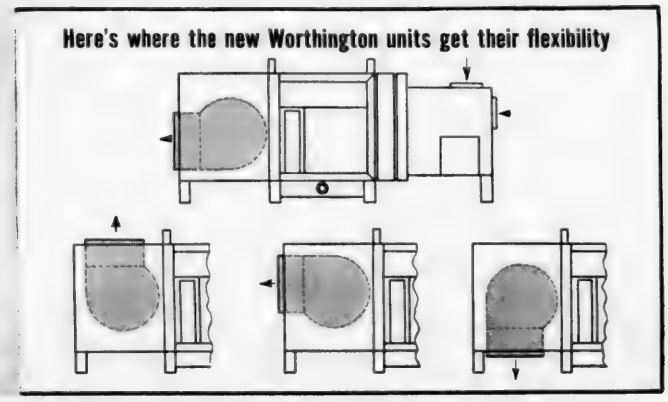
- **Up to 19,000 CFM!** You get more capacity from compact units.
- **Easy installation.** Choose either horizontal or vertical units.
- **Up to 81 different coil** combinations.
- **Lubricated-for-life** fan shaft ball bearings.
- **Accessibility!** Entire fan section can be easily removed. Removable panels and casings simplify inspection, oiling and adjustment.

A.6.75-V

WORTHINGTON

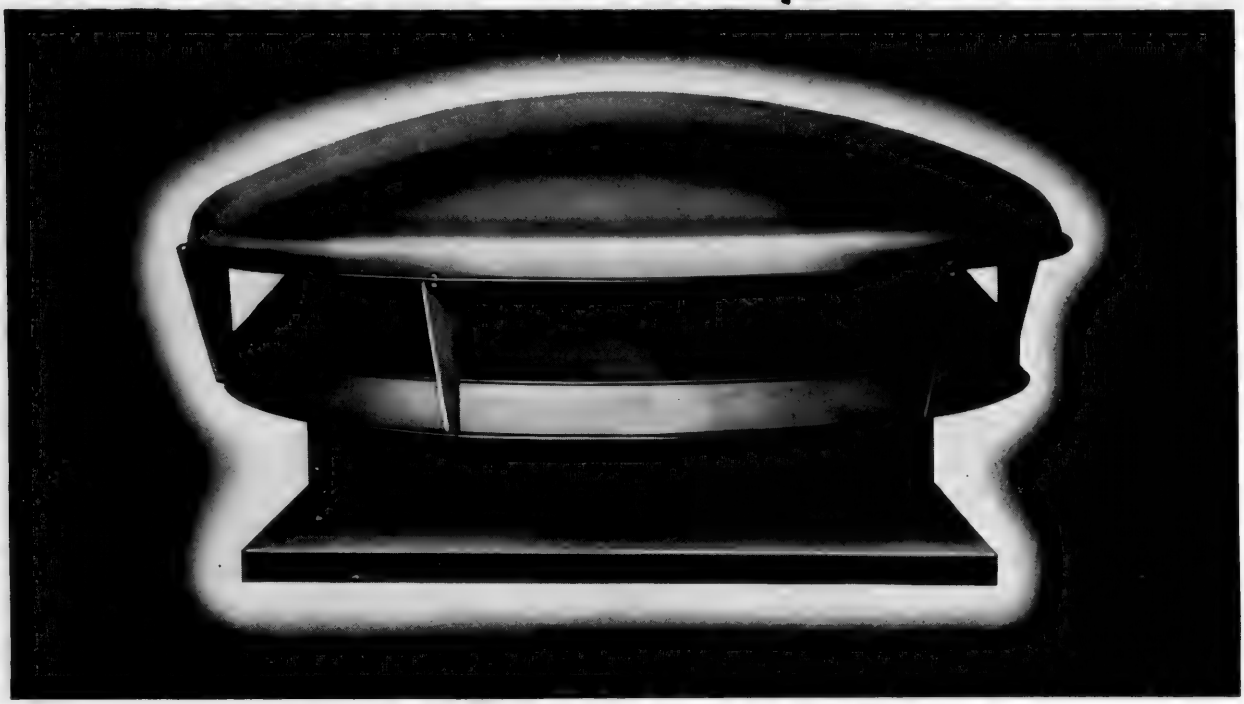
CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME





ADJUSTABLE DISCHARGE. Fan section may be mounted with top discharge as shown above. Or discharge may be directed to front or rear of the unit. See diagrams.

A ROOF VENTILATOR WITH EYE-APPEAL PLUS HIGH EFFICIENCY



NEW *Allen* "I-LINE" ROOF FAN
Gives You the *LOW CONTOUR* You Want

. . . and with the

FEATURES YOU WANT

- Low silhouette
- Low noise level
- High efficiency
- Rigid construction
- Low first cost
- Low operating cost
- Vibration-free for long life
- Easy to install (no extra base needed)
- Easy accessibility for lubrication, inspection and cleaning
- Versatility (supply or exhaust units)
- Wide capacity range (400 to 34,000 cfm)
- Choice of two types of standard base

The new *Allen* "I-Line" Roof Fan meets the architect's demand for an attractive unit that hugs the roof without sacrificing the high efficiency required by engineers. This is accomplished by a circular spun hood and fan venturi with a directional baffle so arranged in relation to the propeller as to provide maximum efficiency with minimum over-all height.

In addition, the new "I-Line" design makes installation exceptionally easy and the hinged hood simplifies maintenance and cleaning.

The *Allen* "I-Line" Series Roof Fans are available with *Direct Drive* (400 to 34,000 cfm) or with *Belt Drive* (4,000 to 20,150 cfm).

•

See Sweet's (8b/Al) or write for catalog that gives you specifications and complete performance data.

ALLEN ENGINEERED VENTILATION

ALLEN COOLER & VENTILATOR, INC.

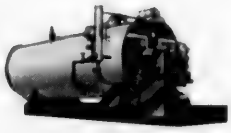
ROCHESTER, MICHIGAN

Roof ventilators for every commercial and industrial need • Representatives in principal cities

MINIMUM INSTALLATION COST
MINIMUM MAINTENANCE COST
MINIMUM OPERATING COST

and

MAXIMUM EFFICIENCY



TESTED AND READY

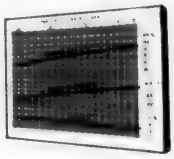
Not just completely factory assembled, but completely fire tested at the factory before shipment . . . and guaranteed on the basis of this test.

BUILT TO LAST

Bigger, heavier, and designed to last . . . indicative of this is the slow speed induced draft fan integrated in the design of the boiler.

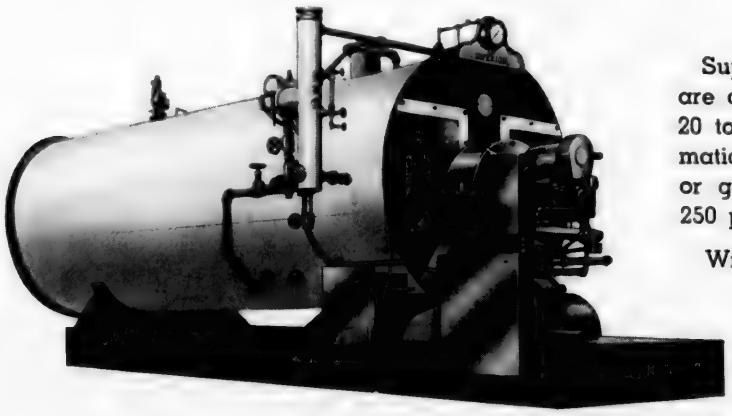
FULLY AUTOMATIC BURNING OIL OR GAS OR BOTH

The economy of firing that follows the load is increased by the ability to change over from one fuel to another to compensate for fluctuations in the market.



80% THERMAL EFFICIENCY GUARANTEED

Based on its own individual factory test, every Superior Steam Generator is guaranteed to achieve its maximum rated capacity at thermal efficiencies in excess of 80%.



Superior Steam Generators are available in 18 sizes from 20 to 600 b.h.p. for fully automatic operation burning oil, or gas, or both. Pressures to 250 p.s.i.

Write today for Catalog 819.

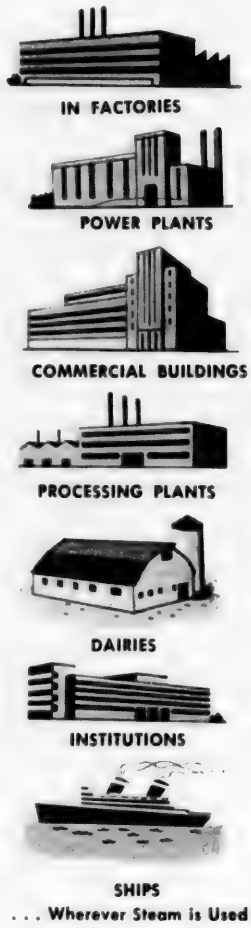
for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
STEAM GENERATORS

TEST OF TIME

LAWLER'S longer lasting quality insures YOUR reputation!

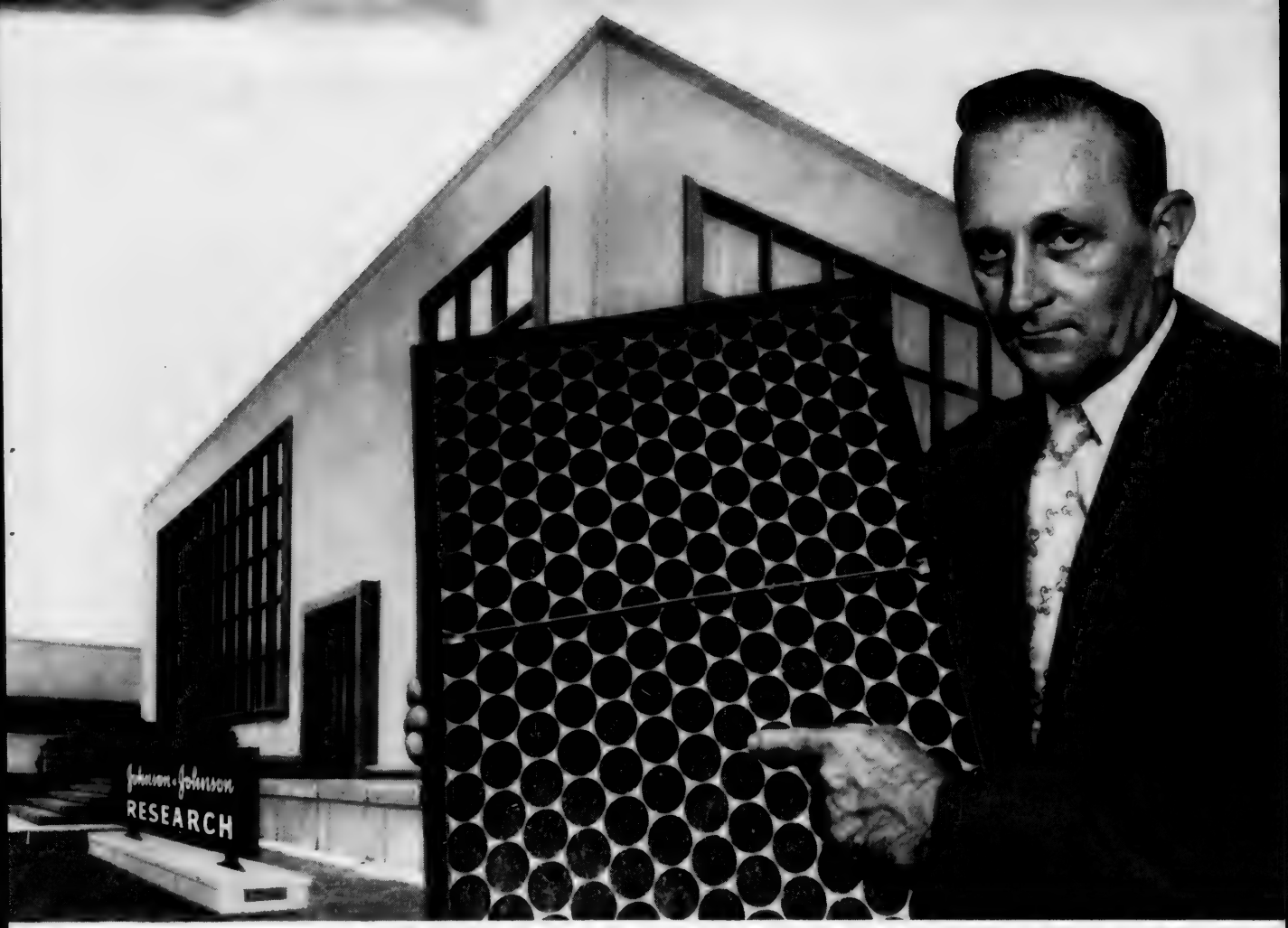


Type "S" Thermostatic Temperature Regulator for automatically regulating the flow of liquid or steam through a valve, such as in the steam tables illustrated above.

Lawler's "Performance-Tested" design combines pioneering experience with engineering leadership. The use of specially chosen metals assure YOUR customers years of positive, accurate temperature control with lowest maintenance cost . . . the best insurance YOUR REPUTATION can have.

The Lawler Line **of Thermostatic Controls**

LAWLER AUTOMATIC CONTROLS, INC. 453 North MacQuesten Parkway, Mount Vernon, N. Y.



Mr. Bors points to one of the many sizes of Glasfloss Filters used at Johnson and Johnson's research center and other plants and offices in New Brunswick, N.J.

"We like the high efficiency and easy handling of Glasfloss Air Filters"

says Mr. Alexander Bors, Maintenance Supervisor at Johnson & Johnson

In the plant offices of Johnson & Johnson, New Brunswick, New Jersey, employees enjoy exceptionally clean, decontaminated air at minimum costs to the company.

Plant personnel state that the highly efficient filtering action and handling ease of Glasfloss Air Filters have made such results possible. Mr. Charles Sutton, field and maintenance engineer, puts it this way. "After three years of Glasfloss, we are convinced that we have obtained the optimum of filter efficiency and ease of handling . . . more than 90% of the contamination is removed by Glasfloss units . . . an obvious improvement over previously used spun glass filters."

Such results have led the company personnel into planning Glasfloss Filtering for a new surgical dressings research and manufacturing plant now under construction.

What's different about Glasfloss that makes such filtering efficiency possible? First, Glasfloss uses only extremely fine, silky glass fibers that are kind to hands and skin. Lighter-to-heavier density of media from front to back stops surface loading, dust and dirt builds up from the inside out. To you, this means Glasfloss catches more dust and dirt, doesn't hamper the flow of cooled or heated air, lowers maintenance costs. Write for complete information on Glasfloss Filters now, ask for Bulletin DF3. Address your request to Glasfloss Dept., Fiber Glass Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pennsylvania.

Over 800 tons of refrigeration supply cold water to 20 individual unit conditioners. All fresh and re-circulated air is filtered by Glasfloss in these units at the total rate of 320,000 cfm.

GLASFLOSS IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

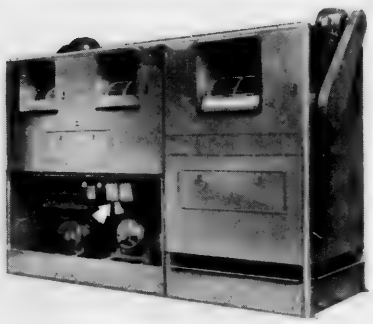
Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia and St. Louis

FIBER PG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

ALLEN-BRADLEY *Motor Controls and Accessories for Refrigeration and Air Conditioning*



Bulletin 709 Across-the-Line Starters

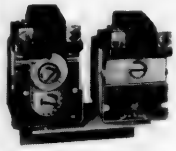
Bulletin 837 temperature control

Bulletin 836 pressure switch

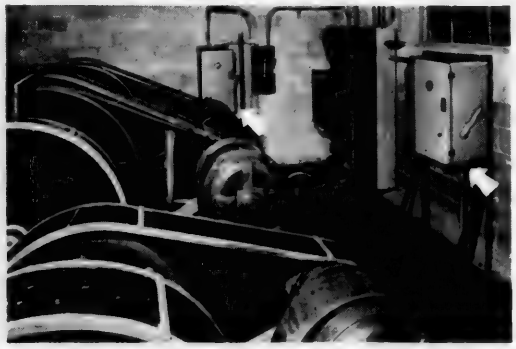
Bulletin 849 pneumatic timer

Bulletin 712 Combination Starters

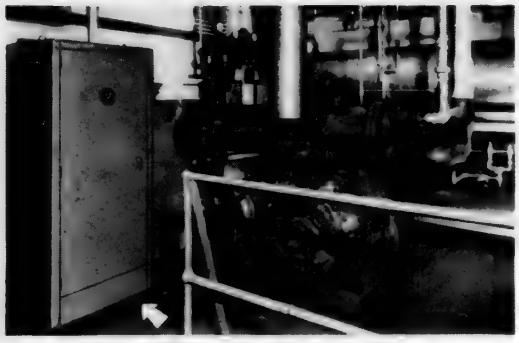
Bulletin 640 Manual Resistance Starters



High and low pressure cutout

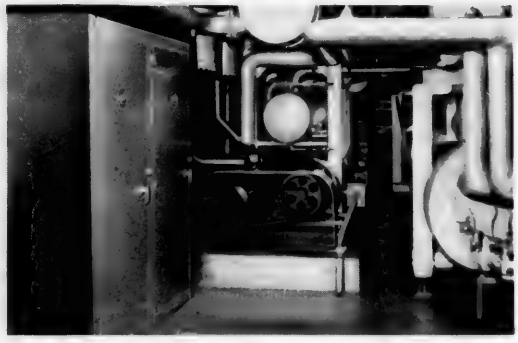


Bulletin 646 Manual Autotransformer Starters



Bulletin 740 Automatic Resistance Starter

Bulletin 800 3-way selector switch



Bulletin 746 Automatic Autotransformer Starters

The Sign of Quality Motor Control

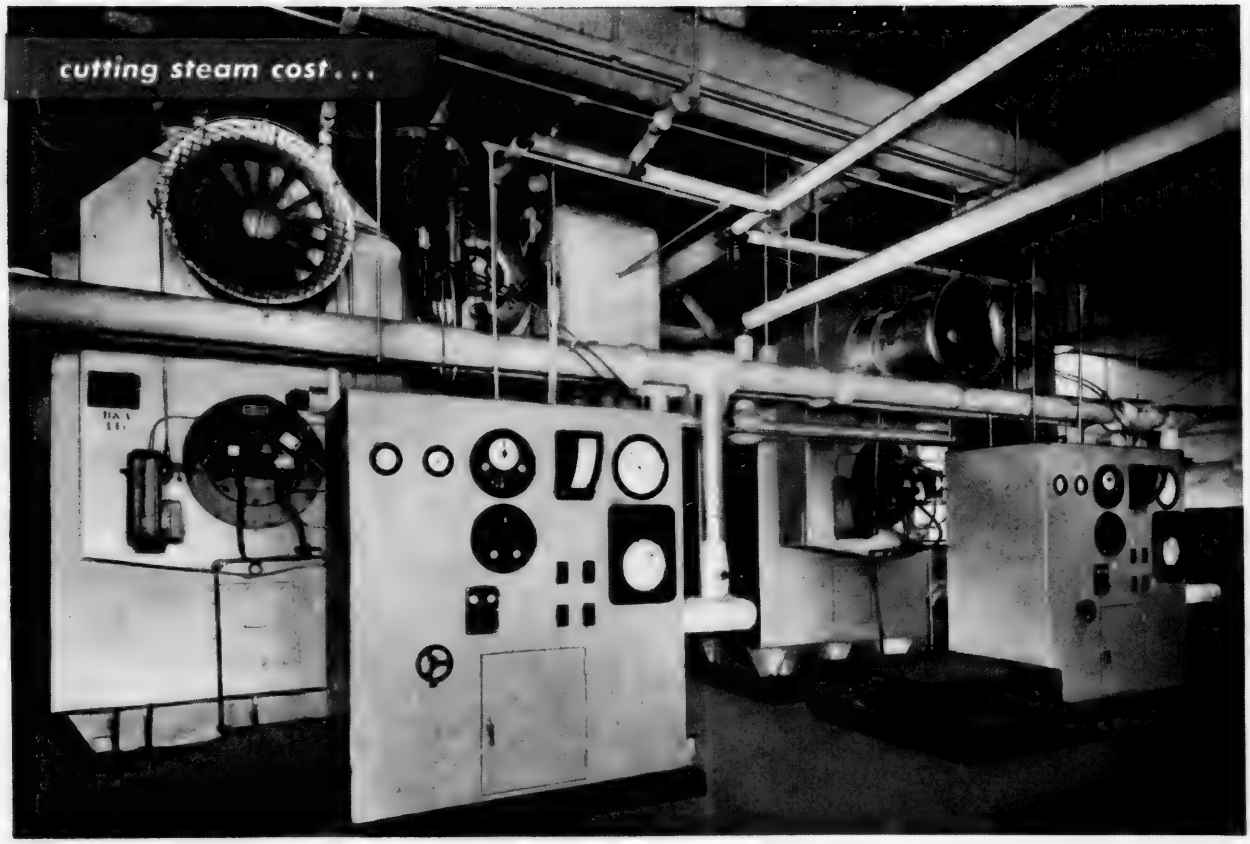
Allen-Bradley motor starters have the simplest contact mechanism yet devised for air-conditioning or refrigeration installations . . . only ONE moving part . . . the solenoid plunger which carries the double break contacts.

There are no trouble-causing pins, bearings, or jumpers. The cadmium silver alloy contacts never need cleaning, dressing, or filing . . . eliminating costly and troublesome maintenance.

Allen-Bradley timers, pressure and temperature switches are reliably accurate . . . precision operation is maintained over long periods of service.

Specify Allen-Bradley—the name that stands for "Quality" motor control. You cannot make a better selection!

Allen-Bradley Co.
1330 S. Second St., Milwaukee 4, Wis.
In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.



—B&W FM Boilers *are workin' for the railroad...*

At the New York Central Railroad Station in Springfield, Mass., two B&W Integral-Furnace Boilers, Type FM have earned their reputation for being "good steamers all right" during the past two years. The units have been in service since September 1953, with time out each year during the slack summer load.

Springfield Station contains a sizeable area and handles a moderately heavy traffic load in both trains and people. Steam produced by the FMs is utilized, in season, to heat cars, station, and a warehouse almost a mile away, supply hot water for all purposes, and meet requirements of the restaurant and barber shop.

Usually operated at about 150 psi, each FM unit is designed to generate 20,000 lb. of steam per hr. During heavy winter load periods both boilers are operated. However, when the heating load is not the major factor, one unit carries the load, which averages around 12,000 lb per hr.

Fully automatic operation, with fuel-air ratio control, provides ready response and efficient combustion for fuel savings and smoke control.

Here in Springfield, as in many other installations of all kinds—for power, processing and heating, for institutions, utilities, industries, and commercial establishments—B&W Boilers are effectively demonstrating their versatility and suitability for a wide variety of applications. The FM Boiler is available in standard sizes to 40,000 lb steam per hr at pressures to 235 psi and many are in service at higher pressures and with moderate superheat. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

COST-SAVING FEATURES

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

BABCOCK & WILCOX

BOILER DIVISION

G-721

WHAT THEY SAY

IS MORE IMPORTANT THAN

WHAT WE SAY!

We can tell you a lot about WICOR's superiority over similar materials. But even more important, we can show you testimonials from contractors who have found WICOR to be as trouble-free, effective and economical as we claim. Write us for case histories which parallel your own requirements.

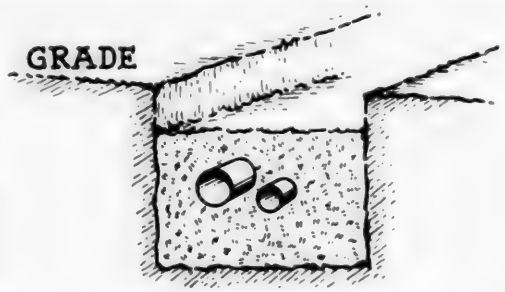
UNDERGROUND PIPE INSULATION

IS THE LOWEST COST — HIGHEST QUALITY INSULATING SYSTEM

Installing WICOR is simple and easy—requiring just 4 steps. (1) Dig trench so that there is a clearance between pipes and surrounding surfaces. (2) Install WICOR expansion material around underground pipes. (3) Pour WICOR monolithically around pipes in a continuous mass. (4) Backfill trench in 24 hours.

TYPICAL WICOR APPLICATIONS

- **Steam distribution lines**
- **Hot water distribution lines**
- **Chilled water or refrigerant lines**
- **Fuel oil lines**
- **Condensate return lines under floor slabs and buildings**
- **Radiant heat panels in masonry floors**



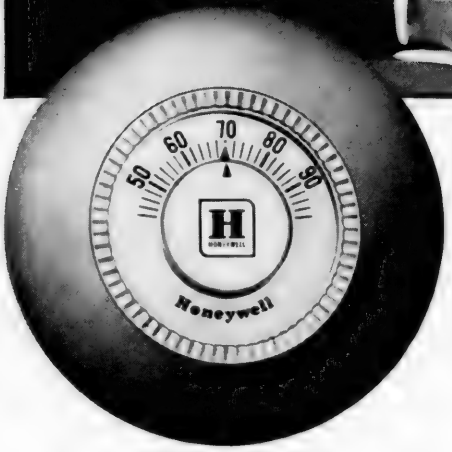
CROSS-SECTION THROUGH TRENCH SHOWING 2 PIPES IN WICOR INSULATION CONDUIT

Write for information and specifications

WATERPROOF INSULATION

FOR UNDERGROUND PIPES

WATERPROOF INSULATION CORPORATION
3626 Woodland Avenue
Baltimore 15, Md.



The thermostat on the wall

Outmodes annoying, ineffective manual-comfort controls

TODAY there's one sure method of providing constant comfort without tiresome, time-consuming adjustments of switches or valves on the heating or cooling unit.

Key to this one sure method is a thermostat on the wall.

Thermostatic control is automatic—all year. There's no manual on-off operation with resulting cycle of too-hot, too-cool. Provides uniform comfort both winter and summer.

Thermostatic control is sensitive. The thermostat is a precision instrument; it maintains a set temperature accurately.

Thermostatic control is convenient. Unlike switch or valve types of heating control, the thermostat is always conveniently located. Changing a setting is easy and sure.

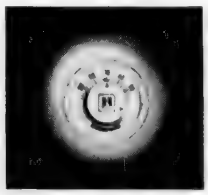
Honeywell thermostat systems are versatile. Only Honeywell makes all three types of thermostats—pneumatic, electric, electronic. Each group offers a choice of many models.

For complete information and help in selecting thermostatic controls for your clients, call your nearest Honeywell office. For more details on the Honeywell Round, write Honeywell, Dept. AH-4-40, Minneapolis 8, Minn.

The thermostat that was styled with modern architecture in mind

The Honeywell Round is the most popular thermostat sold today—and the first truly *new* design in years. Made in pneumatic, electric, and electronic models for accurate, economical control of heating or cooling in hospitals, apartments, offices, schools, industrial buildings, hotels, motels and homes.

Practical! Ruggedly designed, yet it's precision-built for long service.



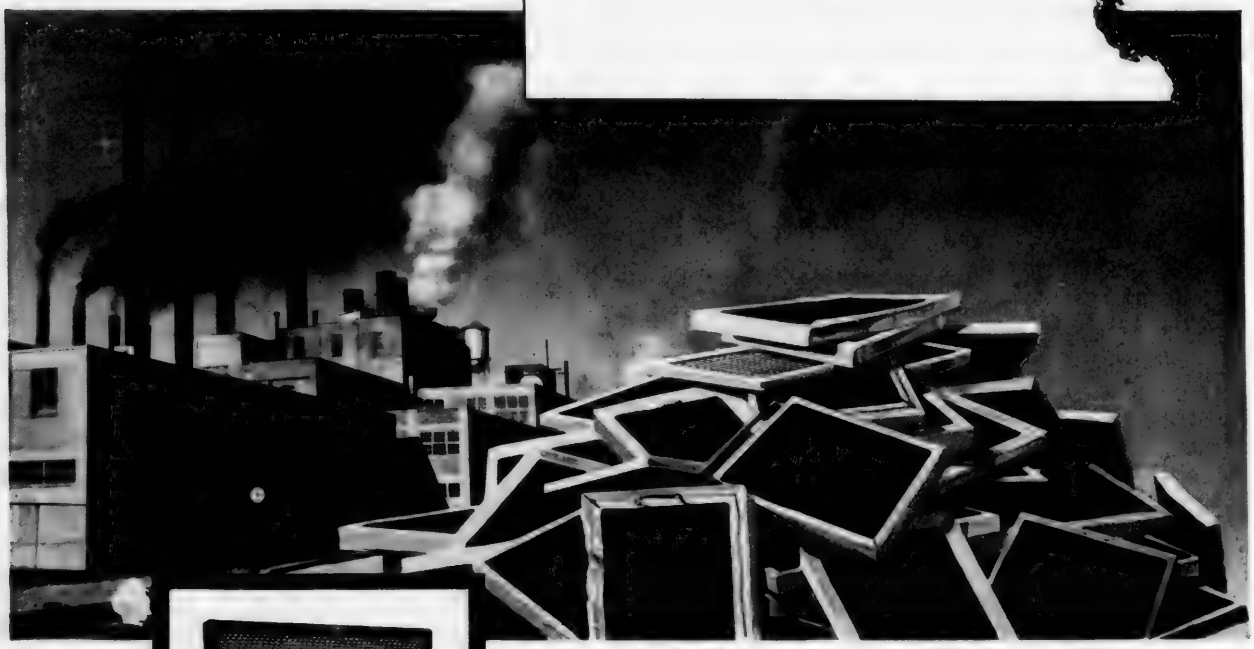
Easy to use! Setting and checking are simplified by one easy-to-read scale.

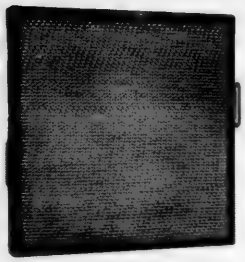
MINNEAPOLIS **Honeywell**

Sign of sure comfort—a thermostat on the wall

First in Controls

HERE'S THE SEQUEL TO "...or equal"





Standard 2" FAR-AIR Panel Filter.

Send for your copy showing complete specifications on the FAR-AIR line of quality filters.

When you see this specification..."FAR-AIR® filters or equal" remember that these filters *have no equal.* Substitutes mean contributions to the junk pile and higher eventual costs, so it pays to install the finest—FAR-AIR.

In FAR-AIR you get filters that handle more air with greater efficiency. Because of their greater dirt-holding capacity, you save up to 60% in maintenance. The "lifetime engineering" of FAR-AIR filters with their heavier frames, reinforcing rods and other features, insures that each unit will continue to operate with replacements virtually eliminated.

Yes, you'll want to use FAR-AIR filters eventually, so why not install them initially. Write for complete catalog information to FARR COMPANY, P.O. Box 45197, Airport Station, Los Angeles 45, California.

ORIGINATORS OF FAR-AIR CERTIFIED FILTER SERVICE

FARR COMPANY

NO COMPROMISE ON QUALITY

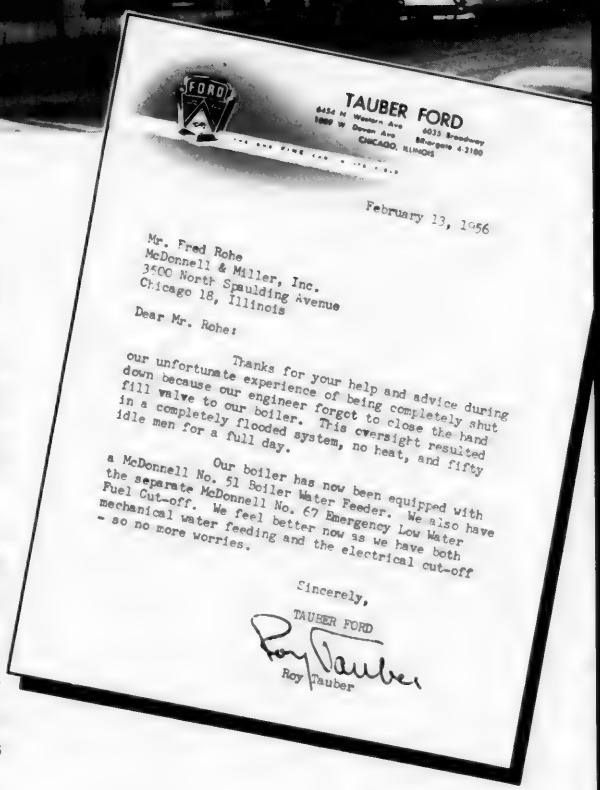
Los Angeles, New York, Chicago

New Orleans

MANUFACTURED UNDER LICENSE BY FARR COMPANY MANUFACTURING LTD MONTREAL CANADA

Stopped Cold for a Day!

Tauber Ford Sales and Service on Devon Ave., in Chicago, one of three such locations that make Tauber one of the city's leading auto dealers. A flooded boiler room here—result of a left-open hand fill valve—stopped business due to the cold for more than a day.



TAUBER FORD
6454 N Western Ave
1889 W Devon Ave
6035 Broadway
CHICAGO, ILLINOIS
Bittersweet 4-3100

February 13, 1956

Mr. Fred Rohe
McDonnell & Miller, Inc.
3500 North Spaulding Avenue
Chicago 18, Illinois

Dear Mr. Rohe:

Thanks for your help and advice during our unfortunate experience of being completely shut down because our engineer forgot to close the hand fill valve to our boiler. This oversight resulted in a completely flooded system, no heat, and fifty idle men for a full day.

Our boiler has now been equipped with a McDonnell No. 51 Boiler Water Feeder. We also have the separate McDonnell No. 67 Emergency Low Water Fuel Cut-off. We feel better now as we have both mechanical water feeding and the electrical cut-off - so no more worries.

Sincerely,

TAUBER FORD

Roy Tauber

Roy Tauber

...A Boiler Water Feeder could have prevented it!

In this case the need came to light when the boiler room went under water.

It happened on a cold night in Chicago. The boiler operator had opened the hand fill valve when he noticed the boiler water was low, then went about other duties and forgot to close it. By next morning the whole system was flooded, the boiler room several feet deep. All business activity stopped; fifty employees were idle; the dealer doesn't like to think of how many service customers were inconvenienced.

There had been a low water cut-off on the boiler — a McDonnell No. 67. Its task was to interrupt the *electrical* circuit to burner in the event of low water. The *mechanical* task of adding water automatically to keep the boiler operating safely — and only as much water as needed, without forgetting — was a job that only a boiler feeder could do. Today there is a McDonnell No. 51 on that boiler as well as the original No. 67 Cut-off.

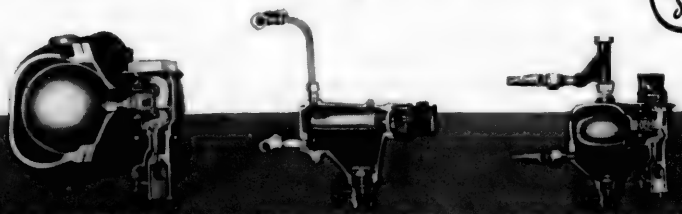
While this may sound like an unusual story, there are countless others to support the wisdom of providing both mechanical and electrical safeguards on every automatically fired boiler. A sticking fuel valve, or the residual heat in stoker installations,—for more examples,—may throw the burden of protection onto the feeder even though the cut-off has functioned as it should.

The best course, for you and your customer, is to recommend a McDonnell Feeder and Cut-off in every case. And that goes for hot water boilers as well as steam boilers.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One M&M SAFETY CONTROLS *Thing Well*

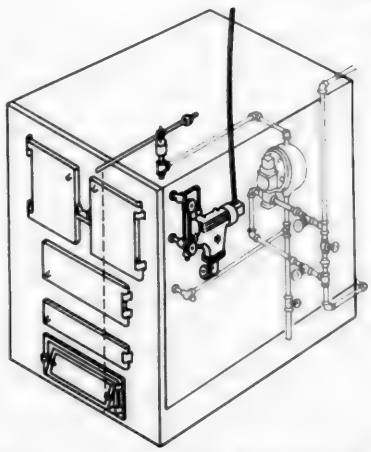
Your Jobber Stocks Them



McDonnell No. 51 Feeder, for boilers up to 35 lbs. Separate feeders and cut-offs are recommended for large heating boilers and process boilers where greater variation in operating levels is needed.

McDonnell No. 67 Cut-off, for all steam boilers up to 20 lbs. For hot water heating boilers use No. 63 Cut-off, for pressures up to 50 lbs.

McDonnell No. 47-2 Feeder and Cut-off Combination, suitable for most heating boilers up to 30 lbs. Other McDonnell Feeders and Combinations for larger boilers, higher pressures.



There was a McDonnell No. 67 Cut-off on the boiler—an *electrical* safeguard. Now, to add a *mechanical* safeguard, there is also a never-forgetting McDonnell No. 51 Feeder (in red).

McDONNELL *Boiler Water Level Controls*

Chase® Type L Copper Tube!

It's a sure thing! Your heating, air conditioning and refrigeration equipment will deliver dependable, *peak performance over the years,* when you fabricate with Chase Type L copper tube!

Inside and outside diameters accurate to thousandths of an inch assure proper tolerances for fitting connections. That means extra-easy assembly of finned sections. Smooth interiors of tube and Chase solder-joint fittings insure a steady, even flow of heating or cooling liquids. And for extra cleanliness, you can get Chase Type L copper tube tightly capped at slight extra cost.

Order Chase Type L copper tube, Chase extra-soft copper refrigeration tube and Chase wrought copper solder-joint fittings from the Chase wholesaler near you!

Chase®

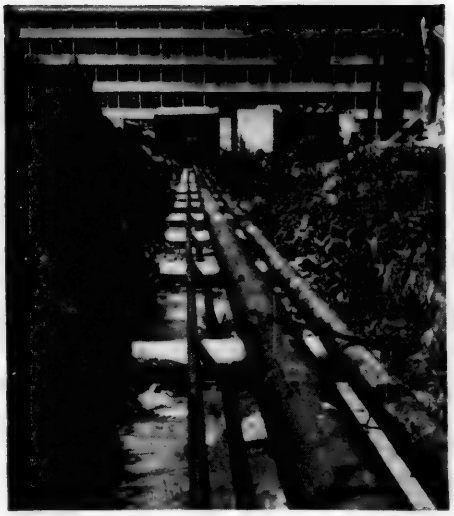
BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

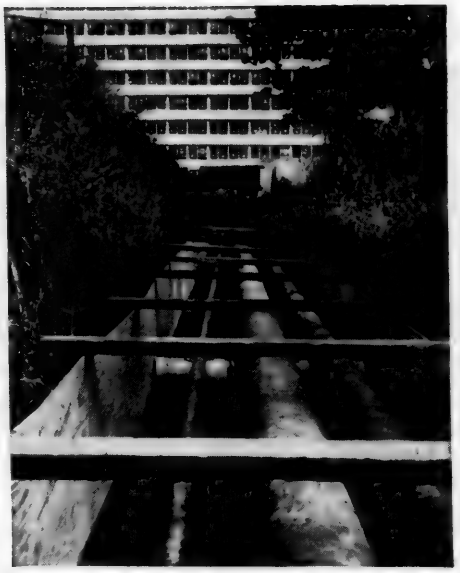
The Nation's Headquarters for Brass & Copper

Atlanta • Baltimore • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Grand Rapids • Houston • Indianapolis • Kansas City, Mo.
Los Angeles • Milwaukee • Minneapolis • Newark • New Orleans • New York • Philadelphia • Pittsburgh • Providence • Rochester • St. Louis • San Francisco • Seattle • Waterbury

General Contractor: Cauldwell Wingate Co.
Heating & Ventilating Contractors: Raisler Corp.
Architects: Kelly & Gruzen
Contracting Engineers: Jaros, Baum & Bolles



845 feet of steam, condensate and return lines run from college power plant to science building (background). Note spot-welded rods prevent pipes from shifting on supports while pipes are being laid.



Inexpensive plywood forms were put up to confine the GILSULATE to the area required and cut down on tonnage needed. Men in background are in front of one of the four access chambers.

Another university approves GILSULATE® for hot underground pipe insulation

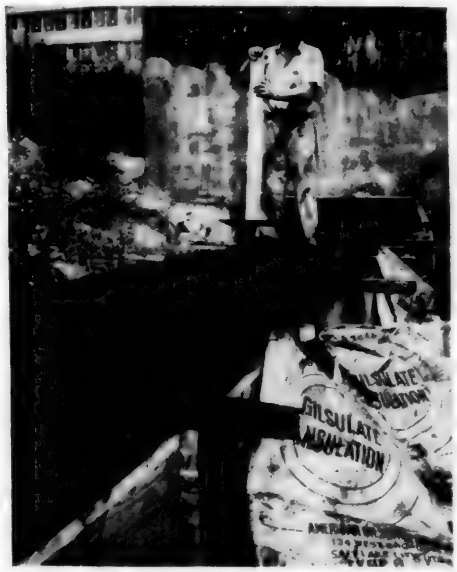
Albert Einstein College of Medicine in New York City, the newest of American medical colleges, chose GILSULATE to insulate and protect 845 feet of pipe running from its power plant to its basic science building.

Covered by 138 tons of GILSULATE —with only six men doing the job— are a 10-inch 185-pound steam supply line; 2-inch high pressure return; and a 6-inch condensate line. Pipes were surrounded with an 8-inch envelope of GILSULATE, except under roads and driveways where thickness was increased to 11 inches.

GILSULATE was approved because no other insulation for hot underground pipes could match it in corrosion protection and low cost of installation. It will pay you to investigate this revolutionary material for your next piping job. Fill in the coupon below for more details.

FACTS ABOUT GILSULATE

1. **EASY TO USE**—just pour and tamp...pipe heat does the rest.
2. **FORMS 3 ZONES** of protection against heat loss and all hazards commonly encountered by hot buried pipes.
3. **NEEDS NO HOUSING OR MECHANICAL SHEATHS:** no mixing, special handling or equipment.
4. **ONLY NEEDS NORMAL PIPE SPACING:** for multiple pipe or cramped conditions.
5. **THREE TYPES AVAILABLE:**
   Type A for 220°-300°F. temp. range
   Type B for 300°-385°F. temp. range
   Type C for 385°-520°F. temp. range



138 tons of GILSULATE were poured and tamped around the pipes by six men in good time—which included a two-mile truck haul from a railroad siding to the job site. Type B GILSULATE was used—the three protective zones were formed in eight hours.

THE TRIPLE-ZONE INSULATION FOR LIFETIME PROTECTION OF HOT UNDERGROUND PIPES

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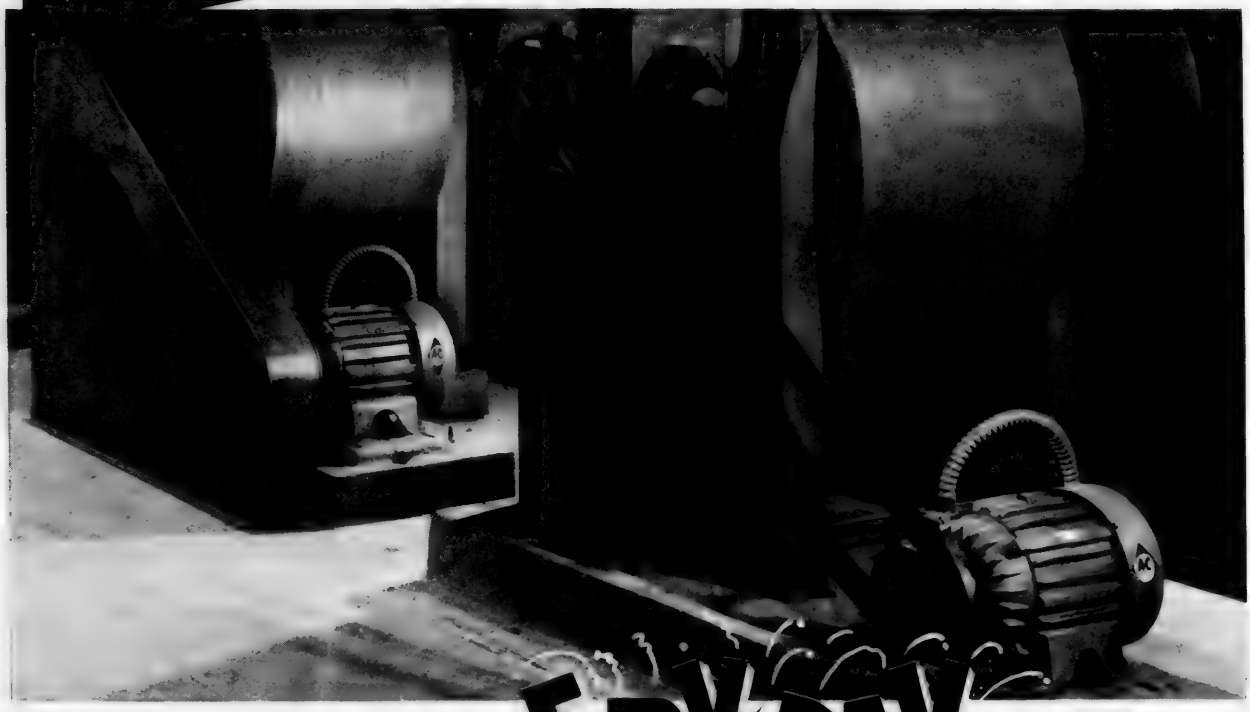

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KEWANEE reserve plus rated boilers

MET SCHOOL HEATING NEEDS

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Problem 1: Limited boiler room.

Solution: Two compact Kewanee Scotch Type Boilers with 50% reserve power guaranteed adequate heat under all conditions.

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Solution: Kewanee Boilers had sufficient reserve to assure a fast, dry steam when needed to give quick heat.

Problem 3: Low operating—maintenance costs.

Solution: Since Kewanee Reserve Plus Rated Boilers certify 50% extra power built in, they operate at "cruising speed." Result—less fuel used, less wear on boiler, greater efficiency delivered.

Kewanee Reserve Plus means boilers are rated on nominal capacity, with adequate power to take care of present needs, emergencies and future expansion. Boilers rated on maximum capacity are inadequate for today's fast growing school needs. Next time select Kewanee Boilers.

Cranbrook School for Boys, Bloomfield Hills, Michigan
Heating Contractor: Laing Plumbing & Heating Company, Pontiac, Michigan
Engineer: Snyder & McLean, Detroit, Michigan

Kewanee LM-800 Series for 15 lbs. steam or 30 lbs. water installed in the Cranbrook School for Boys.

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For higher pressures
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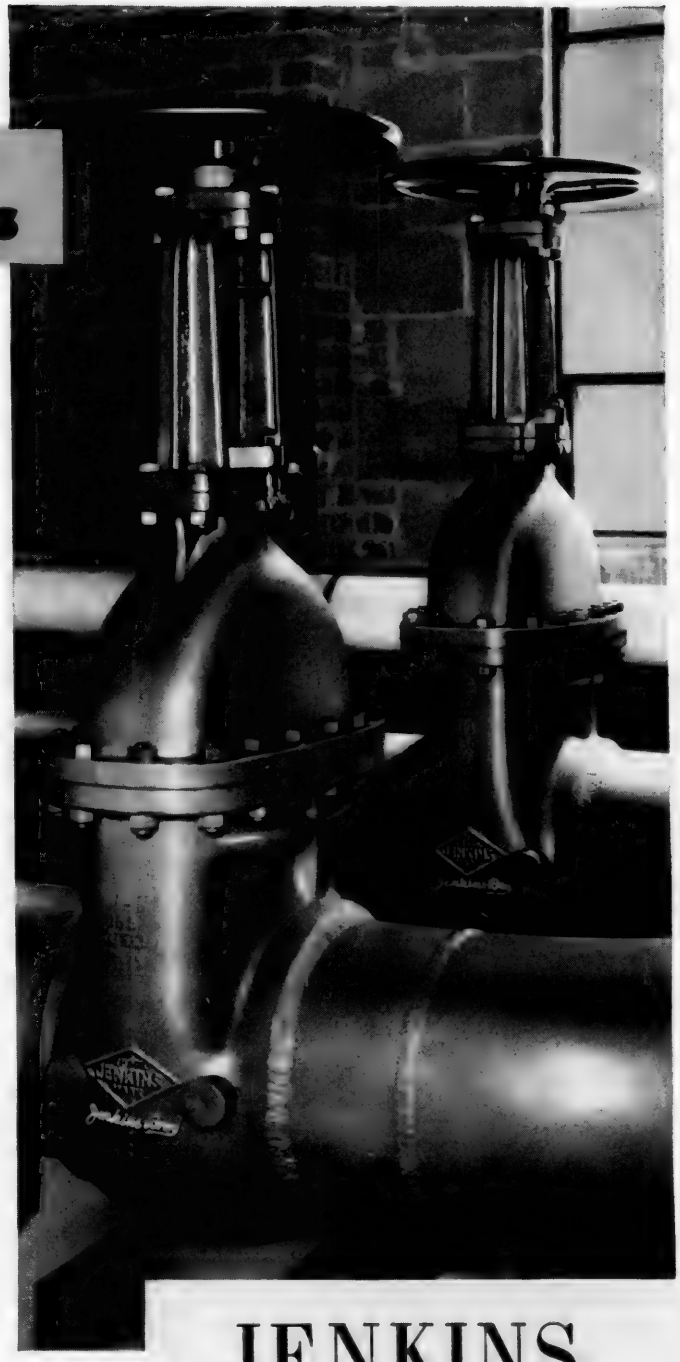
serve the systems planned for lowest operating costs



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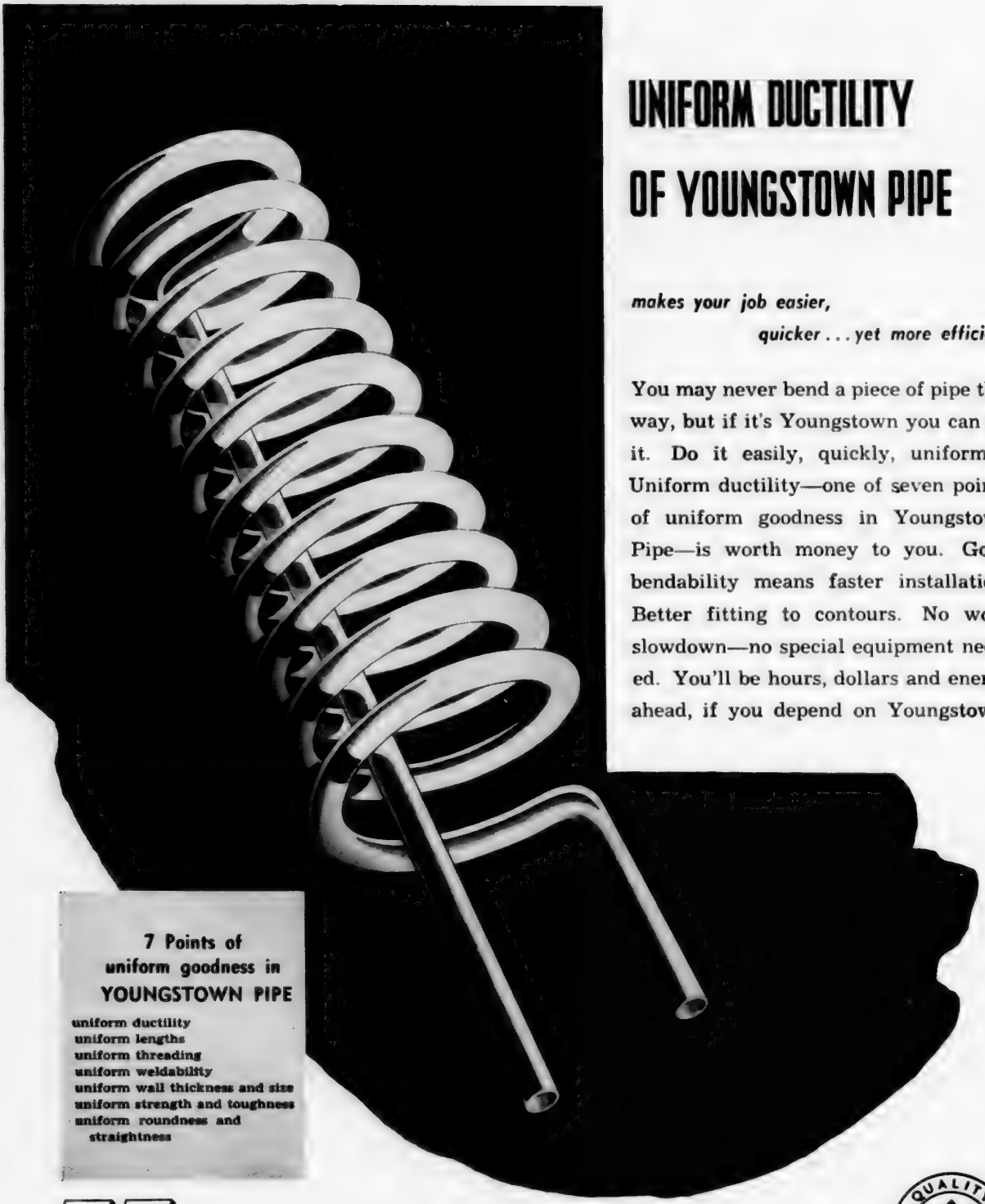

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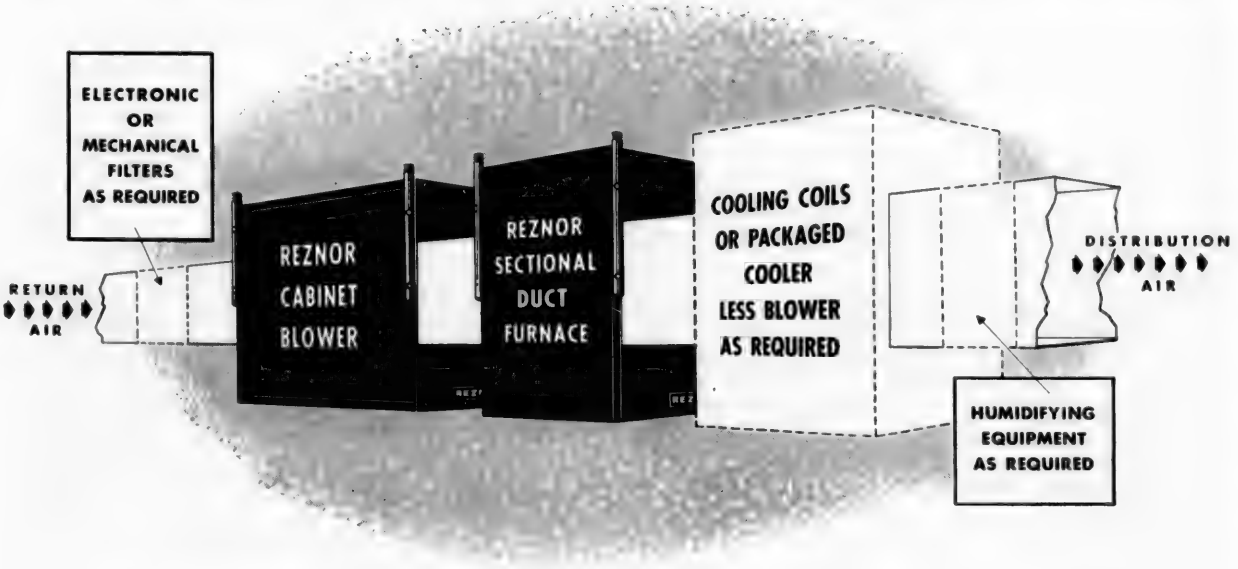
Here's the right start for a *custom-engineered* heating-cooling system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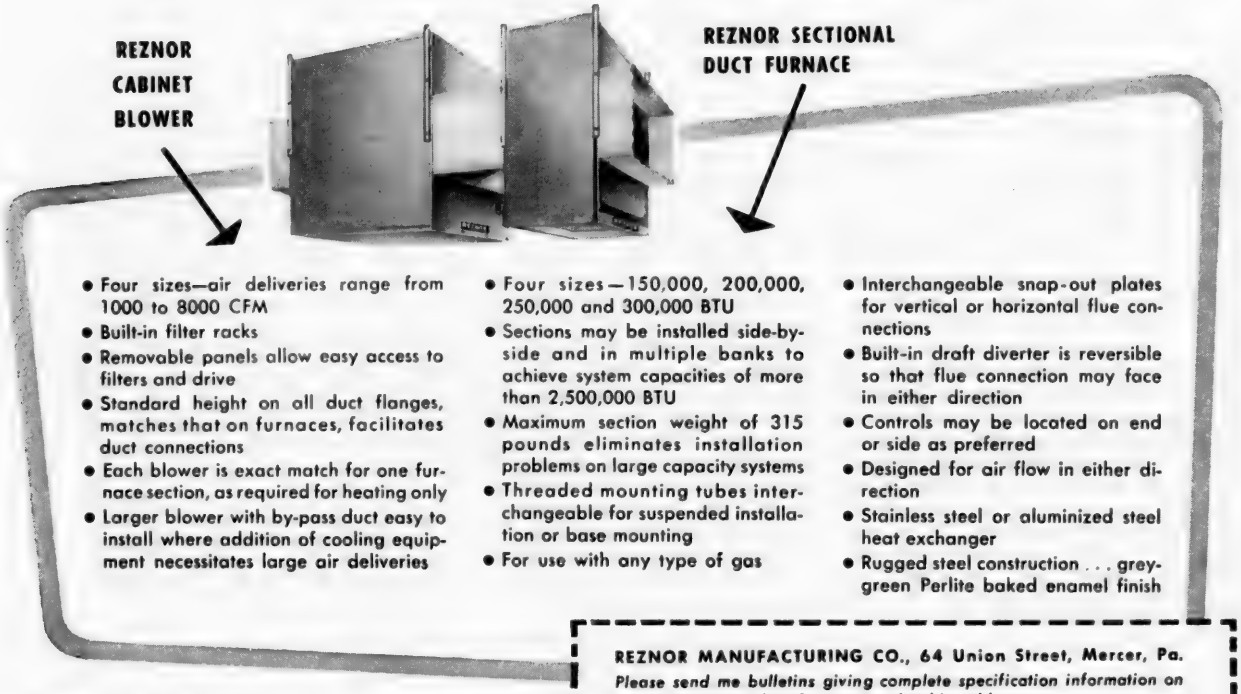
HUMIDIFYING EQUIPMENT AS REQUIRED

You complete the picture by specifying additional components to meet *exact* job requirements



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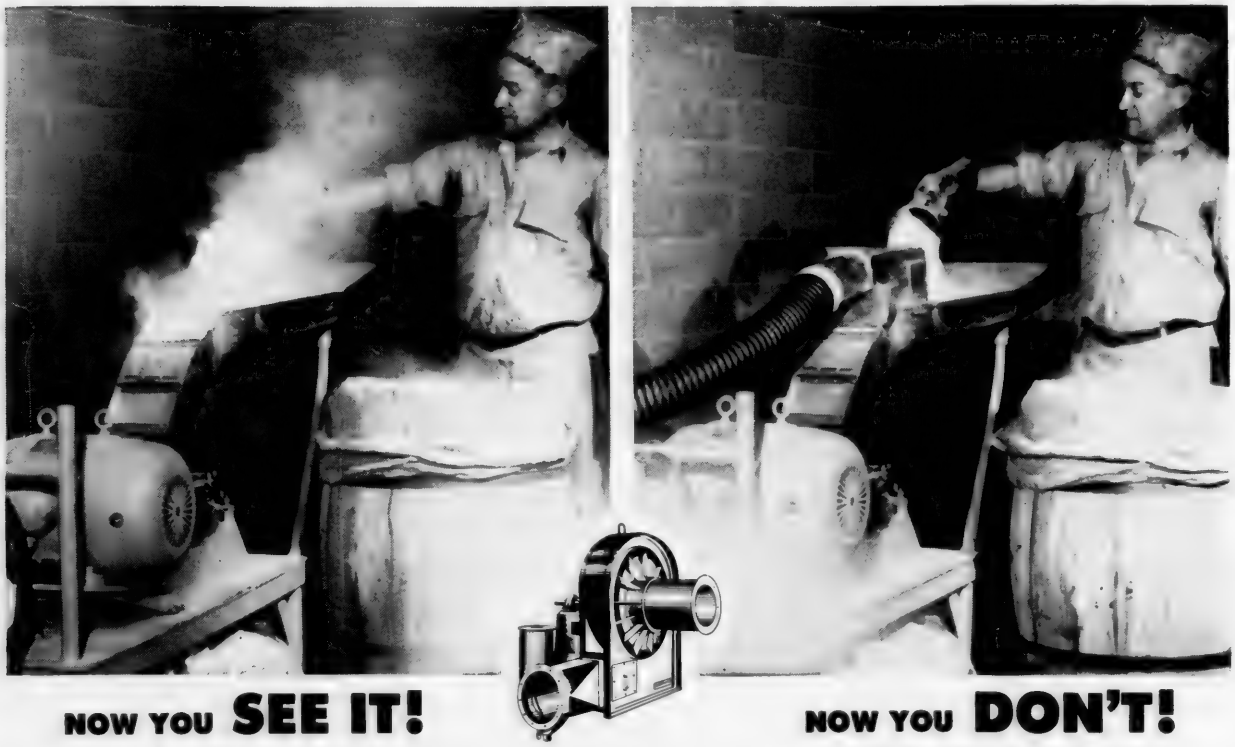
A little air (50 cfm), proper hooding and the right ROTO-CLONE Dust Collector can do the trick—ECONOMICALLY



NOW YOU SEE IT!
Grinding operation before dust control.

NOW YOU DON'T!
Grinding operation after dust control.

Are you conveying, screening, grinding (as above), weighing or packing dry materials? Then the picture at the left may be familiar. Dust "dogs your footsteps" everywhere!

Now, look at the scene at right. Everything clean and serene! Good exhaust hood-design reduced needed air volume to a minimum—50 cfm—making it inexpensive and practical to apply efficient dust control. Resulting benefits? You know them well—

AAF's more than 20 years' experience covers the entire range of industrial dust control problems—has resulted in today's complete line of ROTO-CLONE* Dust Collectors. Whether your dust problem involves a single machine, a complete department or an entire plant operation, this experience can point the way to "short cuts", economies—and results. For complete information, call your local AAF representative or write us direct.

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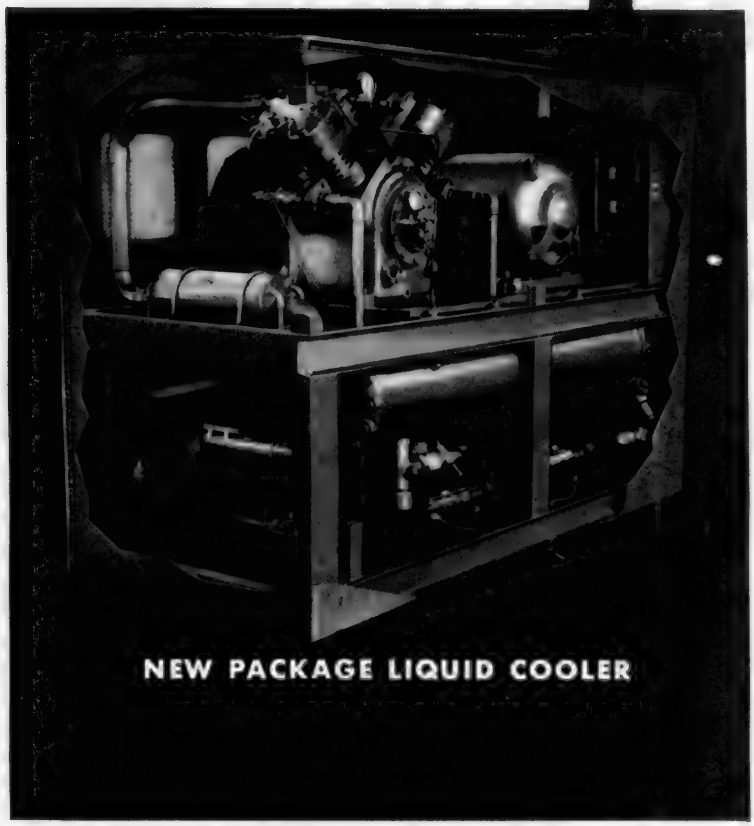

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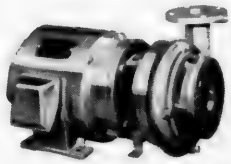

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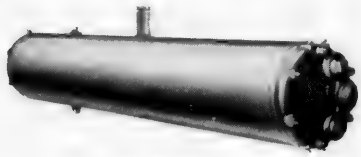

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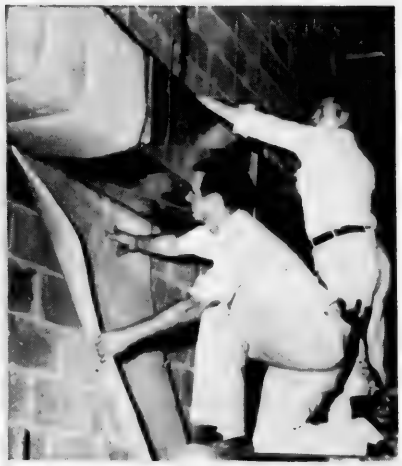

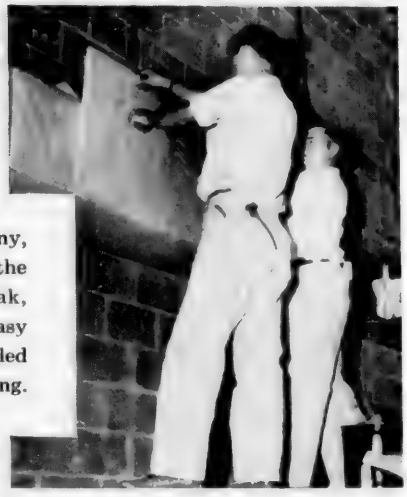

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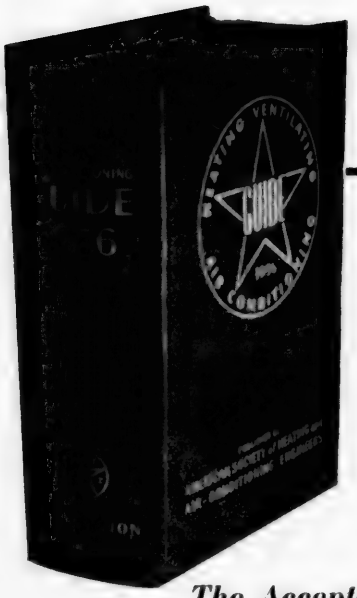

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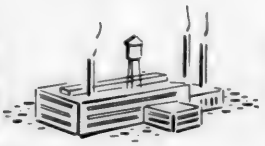

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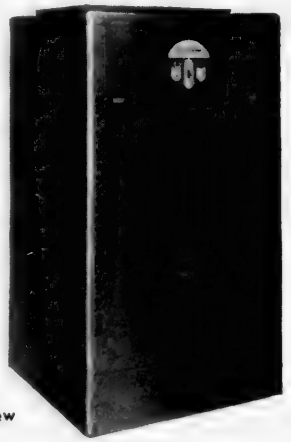

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Bulletin 440—Electro-Staynew Home Precipitator

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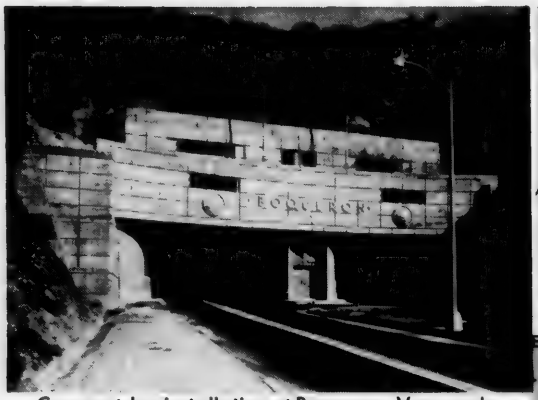
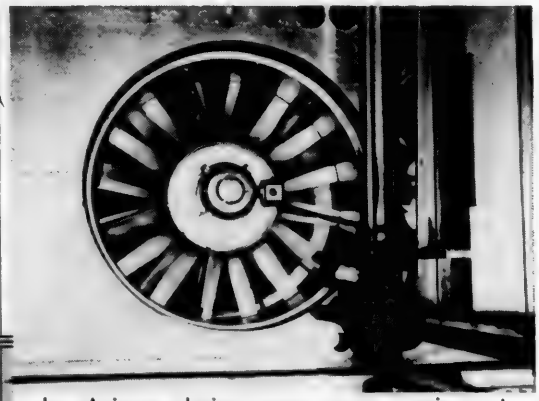
Ventilation Problems: Gone with the Wind

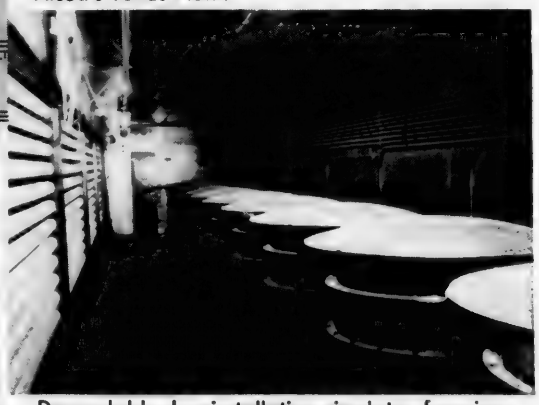


Compact Joy installation at Boqueron, Venezuela, moves huge quantities of air.



Joy Axivane design means power savings at Alcoa's Texas Plant.

Space-saving Joy fans are installed as part of the duct system at Reliance Electric's Ohio Plant.



Dependable Joy installation circulates freezing air in California Cold Storage Plant.

'Round the World, JOY Handles the Hard Ventilating Jobs

Joy handles the hard jobs in ventilation round the world because a Joy fan develops greater volume of air per pound of fan and motor—because of simplicity of installation that eliminates duct offsets, elbows, drives and guards. The JOY Axivane fan is a favorite of ventilating engineers because JOY installations save up to 70% of the space occupied by other fans of equivalent performance. This space-saving feature of Joy fans makes possible more profit-making production area.

An Axivane fan is an integral part of the duct in which it is installed. Pre-lubricated, double-shielded ball bearings permit the fan to be installed in any position—give you long service without attention. These precision air-moving machines are marvels of efficiency and compactness. They provide economical, efficient air circulation for all types of commercial and industrial applications.

You can choose from a standard line of over 136 models specially designed to meet the needs of modern industry. The Joy Axivane Series 1000 is a standard line available to you ready for installation.

For complete information about the JOY standard line of 136 models—to learn about JOY custom engineering service, write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

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WORLD'S LARGEST MANUFACTURER OF VANEAXIAL-TYPE FANS

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Crashing the 100 ton barrier

with KRAMER

UNICON

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UNICON SUCCESSFULLY MET THE TEST THROUGH THE SEVERE SUMMER OF 1955

You, too, can crash the big tonnage barriers with UNICON, the industry's finest remote-type air-cooled condenser. Put Kramer's 18 years of "treasured know-how" in the proper use of air as a condenser coolant to work for you.

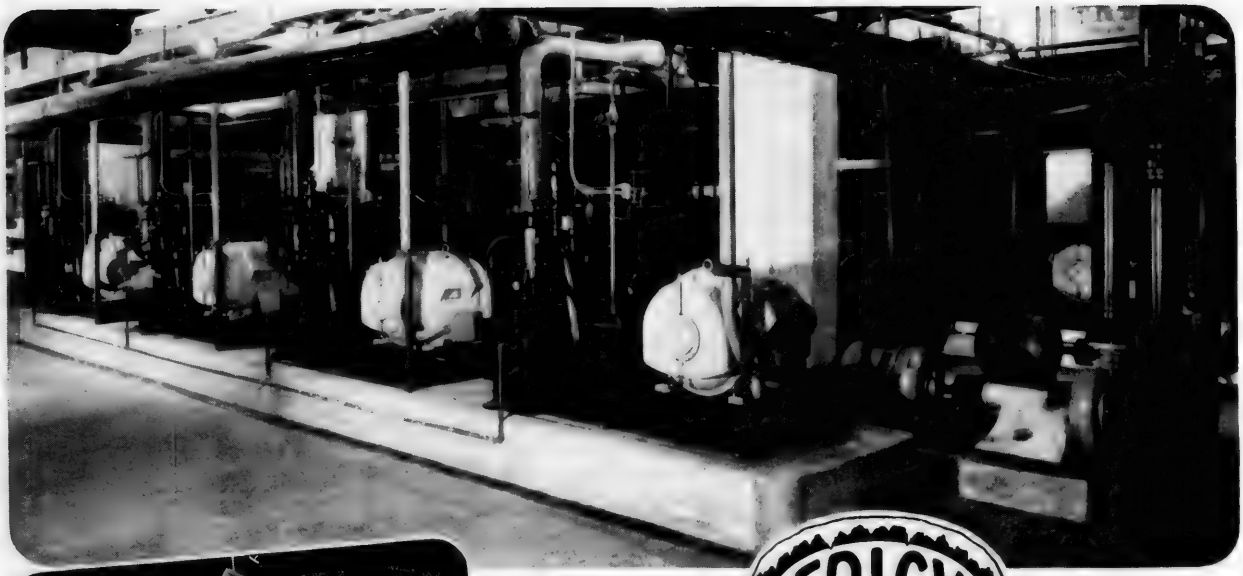
Photo of Kramer UNICONS mounted on roof of Handy-Andy Supermarket in San Antonio, Texas, used with 100 ton air conditioning system. Supplied through United Supply Co., of San Antonio and installed under the direction of Harold Vogt.

Write for Bulletin U-210-L

KRAMER

KRAMER TRENTON COMPANY
Trenton 5, New Jersey

100 TON BARRIER



TRADE FRICK MARK(S)

Air Conditioning

SERVES AMERICAN NATIONAL INSURANCE CO., GALVESTON

The 11-story buildings of American National Insurance are kept cool and comfortable by eight Frick "ECLIPSE" compressors, shown above with condensers, water coolers, pumps and other auxiliaries. . . . There are "ECLIPSE" compressors to handle any load, with any refrigerant, at any temperature.

These handsome buildings house a staff of over 1000 people for American National, which was organized in 1905 and now has in force more than three billion dollars of insurance.

Both buildings were recently air conditioned completely by Decker and Roberts, Frick Distributors in Fort Worth, using among other things eight "ECLIPSE" refrigerating machines. These compressors have the exclusive Frick nine-cylinder design.

Fine buildings require fine equipment. You get the ultimate in air conditioning and refrigerating machinery when you specify "FRICK." Write for estimates and Bulletin 100 today.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

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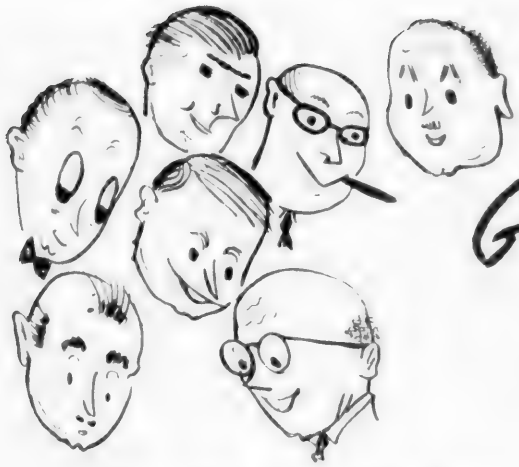

Get the most from your pump investment

TYPE CVS—duplex unit
TWO FLOAT SWITCHES

Recommended for heavy duty service. Separate control mechanism for each pump motor—or one float which controls automatic alternator.

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There's a wide range of types and capacities for every heating pump need. Let Skidmore advise you on your next tough job.

TYPE UV

Type UV Condensation Pump is designed for below floor level returns, and is built in single and duplex units.

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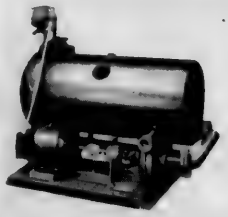

TYPE HS

Type HS Pump is recognized for its dependable low operating cost. Capacities range from 1,000 to 65,000 sq. ft. EDR and pressures from 10 to 75 pounds.

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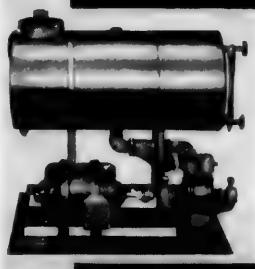

TYPE TM

Type TM High Pressure Turbine Pump. Designed for pressures up to 150 pounds and boilers to 250 H.P.

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THE SKIDMORE CVS SETS THE PACE IN PUMP PERFORMANCE!

Send for the NEW Bulletin

The CVS vertical pump offers more for your money—mechanical shaft seal—greater range of discharge pressures — still retains compact design and light weight.

TYPE CVS—SINGLE UNIT

Representatives in principal cities.

Skidmore Pumps have set a Standard of performance and dependability since 1921.

SKIDMORE PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN

Beth-Co-Weld pipe is used for the heating and plumbing lines at Kennedy Courts, a recently completed apartment development for 400 families at Fort Dix, N. J. *Plumbing and Heating Contractor:* Thomas F. Laverty, Riverside, N. N. J.; *Jobber:* Fleck Company, Camden, N. J.

Apartment Project at Fort Dix . . . Laboratory at Naval Shipyard

Both Have Beth-Co-Weld Piping

Wherever there's new construction going on, there's an excellent chance you'll find Beth-Co-Weld steel pipe being used for plumbing and heating lines, boiler-room piping, and for sprinkler installations.

Beth-Co-Weld is ideal for general-purpose piping. It is made from sound steel by the continuous-weld process. Besides, Beth-Co-Weld is good pipe to work.

Most jobbers carry Beth-Co-Weld in sizes from ½ in. to 3 in., standard-weight and extra-strong, and in 21-ft lengths, plus or minus 1 in. They also carry Beth-Co-Weld in 3½ in. and 4 in. sizes, standard-weight only.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

A network of Beth-Co-Weld pipe, ranging in diameter from ½ in. up, is used in the new Radiological Defense Laboratory, built for U. S. Navy Bureau of Yards and Docks at San Francisco Naval Shipyard. *Mechanical Contractor:* Anderson and Rowe; *Jobbers:* Heieck and Moran, and P. E. O'Hair—all of San Francisco.

NOW 10

New York City Libraries Sarcotherm-equipped!

UNIFORM COMFORT under all weather conditions is of first importance to a library.

Sarcotherm heating controls, ventilating controls and specialties have been installed during the last two years in ten libraries, designed and constructed under supervision of the New York City Department of Public Works.

Sarcotherm controls are extremely accurate, sensitive and dependable. They provide trouble-free performance, promote economical operation and contribute to enthusiastic user satisfaction.

For further information on Sarcotherm weather-modulated controls, Sarco heating specialties and Sarcofin finned-tube and baseboard radiation, write for catalog.

Sarcotherm Controls, Inc., Empire State Bldg., New York 1, N. Y.

10 New York City Libraries Sarcotherm-equipped within last 2 years

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Sarcotherm

AN AFFILIATE OF *SARCO COMPANY, INC.*

Weather-Compensated Controls for steam, hot water and radiant Heating

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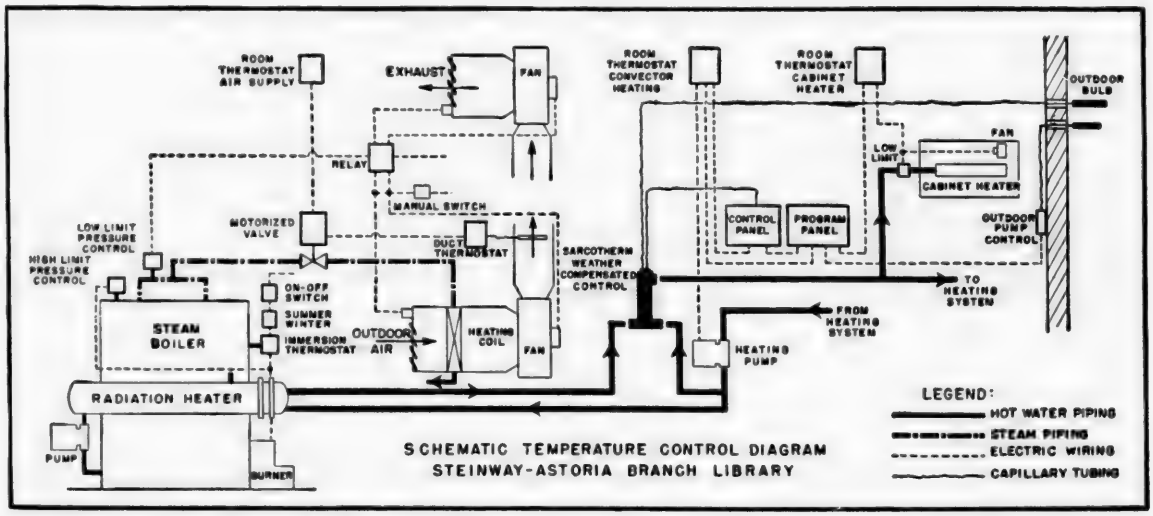
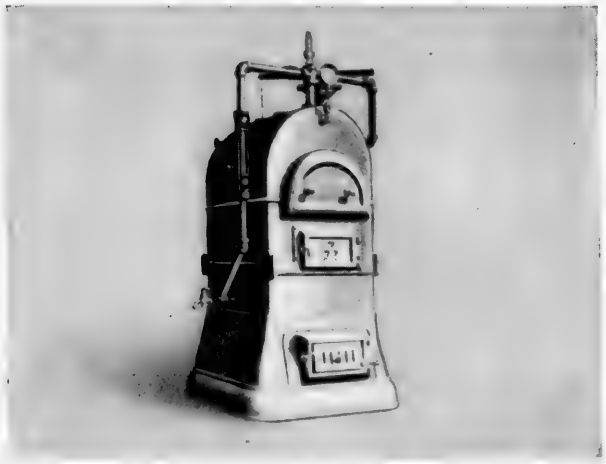


Architect: Adolph Goldberg, Brooklyn, N. Y. Engineers: V. L. Falotico & Associates, Brooklyn, N. Y. Heating Contractor: H. Sand & Co., New York, N. Y.

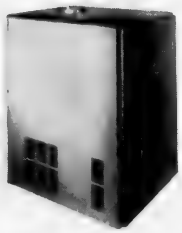
If you are thirty...

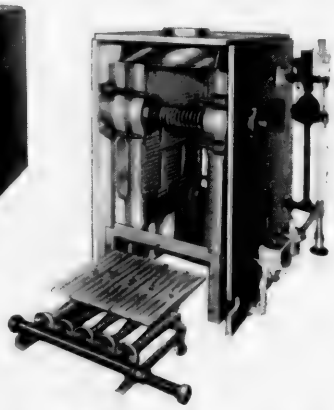
AND INTEND TO LIVE TO BE EIGHTY-FIVE



This is the type of H. B. Smith boiler which has served Mr. Bishop since 1901.

The Boiler to Buy is an H. B. SMITH





This is the H. B. Smith "Century" gas-fired boiler, today's most modern home heating plant.

Why? Well, if history proves anything, the H. B. Smith boiler you install today is quite likely to be the last one you'll ever have to buy! . . . (yes, we do a poor repeat business!).

Take the case of Mr. Frank E. Bishop, 85, of Clarksburg, Massachusetts. Back in 1901, when *he* was thirty, he had an H. B. Smith boiler installed in his home. Although his neighbors have used two or more boilers of other makes since that time, Mr. Bishop continues to enjoy year-in, year-out warmth and comfort provided by his original H. B. Smith unit.

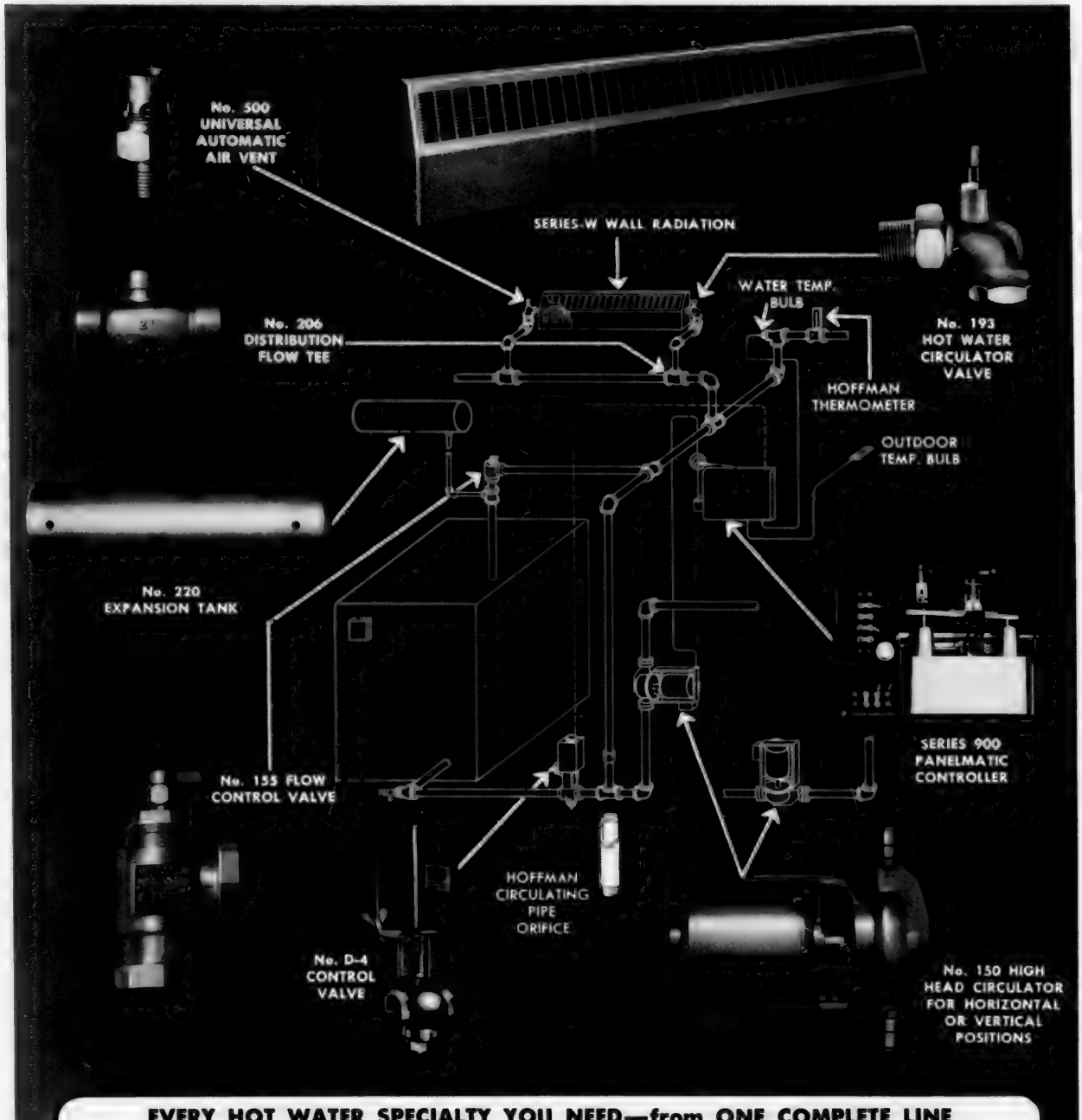
Mr. Bishop's boiler bears little resemblance to today's H. B. Smith home heating plants. But the cast iron unit embodied sound engineering, now so refined in design, material and workmanship that *your* chances of using an H. B. Smith boiler for 55 years are *vastly* improved.

And in addition to long life, H. B. Smith cast iron boilers offer many other advantages: their economy of operation, negligible maintenance expense, ease of conversion to different fuels, and ready expansibility bring their owners heat and hot water at *low cost year after year!*

H.B. Smith **CAST IRON BOILERS**

H. B. SMITH CO., INC., WESTFIELD, MASSACHUSETTS • ***Established 1853***

HOFFMAN COMPLETE EQUIPMENT FOR HOT WATER HEATING SYSTEMS


No. 500 UNIVERSAL AUTOMATIC AIR VENT
SERIES-W WALL RADIATION
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No. 206 DISTRIBUTION FLOW TEE
No. 193 HOT WATER CIRCULATOR VALVE
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No. 220 EXPANSION TANK
SERIES 900 PANELMATIC CONTROLLER
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EVERY HOT WATER SPECIALTY YOU NEED—from ONE COMPLETE LINE

Now you can specify Hoffman products for every spot on a hot water heating system—with three important advantages to you. First, you are assured uniform operating efficiency; second, it saves time from buying to billing; third, it provides one uniform guarantee from a single, recognized source. And, in addition, builders are quick to appreciate the sound Hoffman design features that cost no more than ordinary kinds. New Bulletins on High Head Circulators, Flow Control Valves, Expansion Tanks, Flow Tees, Circulator Valves and Wall Radiation are available, free, no obligation.

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Makers of Valves, Traps, Hot Water Heating Systems, Vacuum and Condensation Pumps . . . Sold by Leading Wholesalers of Heating and Plumbing Equipment

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

Insulation Keeps Arctic Ground Frozen

PROBLEM: When the U. S. Engineers were building the huge air force base at Thule, Greenland, it was necessary, of course, to insulate all hangars and buildings against the arctic cold. However, another insulating problem was that of keeping the building heat from reaching the frozen permafrost under the building. Permafrost is the layer of soil rock which never reaches a temperature above freezing. If it should thaw out under a building, it would lose its compressive strength, and the building would settle and collapse.

SOLUTION: Four inch blocks of Foamglas, cellular glass insulation product of the Pittsburgh Corning Corp., were incorporated in the floor slab. Insulation was laid as a sandwich layer between base and top layers of poured concrete.

RESULTS: Compressive strength of over seven tons per square foot allows the cellular glass sandwich to bear the weight of the concrete wearing surface as well as that of moving tank trucks and huge bombers and transport planes. The glass is impervious to moisture and will not deteriorate. Heat from the building will not penetrate the glass insulation and melt the permafrost base to let the building settle and collapse.

Hot Water Keeps Roses Fresh

PROBLEM: Hill Floral Products Inc., Richmond, Ind., uses up to 150 gallons per hour of 115 deg water to assure that roses are kept in good condition for shipment to wholesale distributors. The Hill organization grows and ships 12 million roses a year. Normally, roses are placed in cold water immediately after the stems are cut. There are times, however, when immediate stem submersion is not possible. To compensate for the time between cutting and immersion, roses are placed in 115 deg F hot water. Containers of roses and the hot water are then placed for 12 hours in a refrigerator from 38 to 40 deg F. By the time the water temperature drops 75 deg, roses have absorbed enough water to fill all the cells in the stem. The blooms are then removed and packed for shipment. Production of 150 gallons per hour of 115 deg water was a special problem for the florist in a plant originally designed without hot water supply.

SOLUTION: A Ruud Sanimaster water heater with a Monel tank was installed in the basement of the shipping department. Storage of water at 180 deg for a mixed water temperature of 115 deg allows sufficient storage capacity to handle holiday peak periods. At the Hill firm, only the mixed water is used.

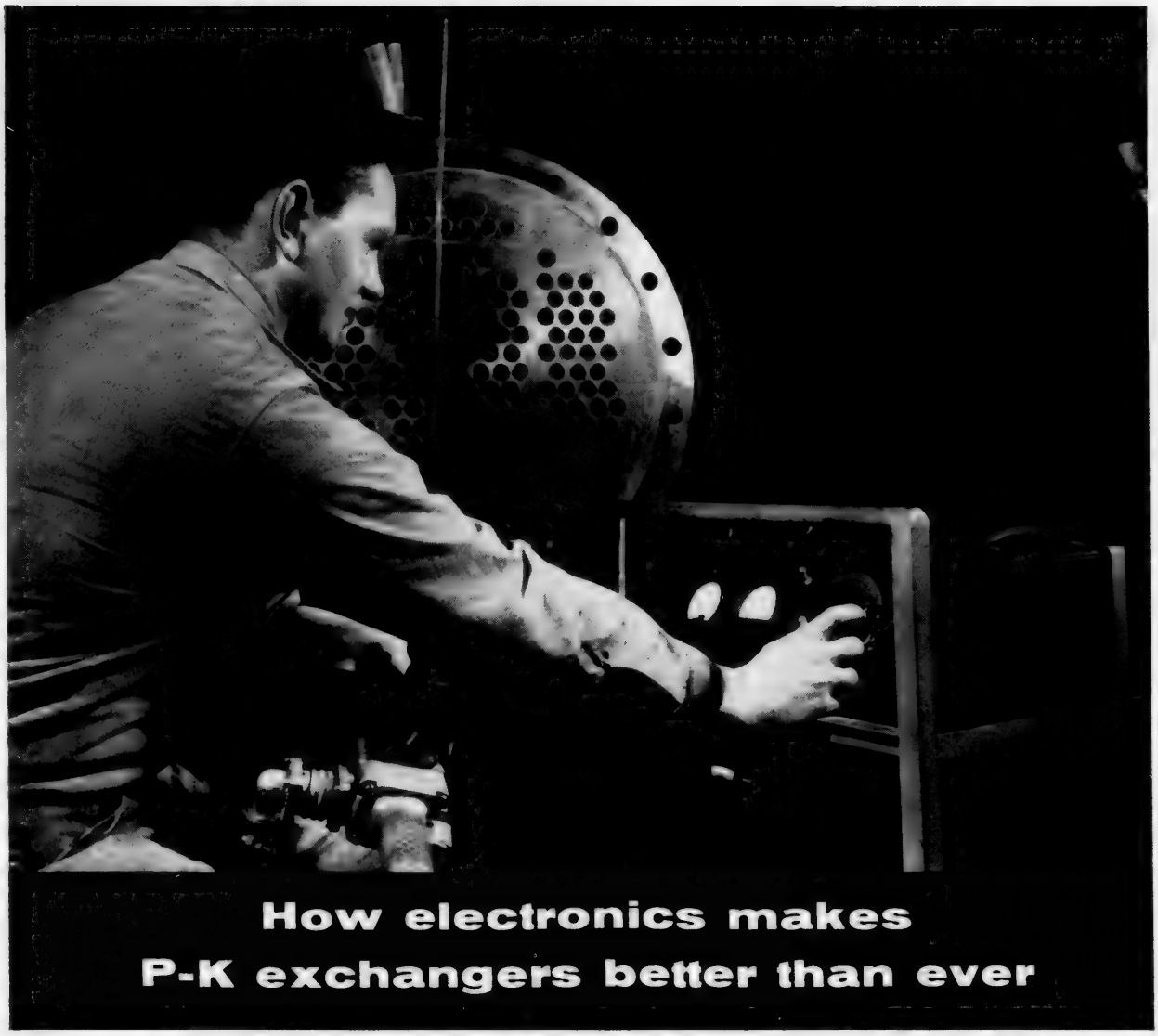
RESULTS: Storing 180 deg water in a heater with fast recovery allows use of smaller storage capacity to handle heavy demand. Fuel bill for 1955 was $81.84 for natural gas.

Printing Plant Air Conditioning Endorsed

PROBLEM: One of the largest printing and lithographing firms in Nashville, Tennessee, the Collom and Ghertner Co., was told that air conditioning and humidity control would aid in many of the departments of the printing process such as paper handling precision register, and ink application.

SOLUTION: With some skepticism, the company installed air conditioning throughout the 50,000 square feet of their one story plant. Each section of the plant and the company cafeteria were air conditioned with two or more Chrysler Airtemp packaged units. In production areas where two units were located, one was arranged to operate off a thermostat and the other off both the thermostat and humidstat in order to provide fine humidity control. The system was designed so that the majority of the units could be installed without ductwork. To minimize the sun load on the flat roof, the entire ceiling was insulated with aluminum foil which reduced cooling requirements by 50 tons.

RESULTS: A company official commented, now that we have it we hardly know how we got along as long as we did without it. Air conditioning not only justifies the expense, but is giving us additional volume of production as well. Our people are comfortable on their jobs, they stay in better frame of mind, their work goes steadily forward. We have found also that air conditioning keeps paper stock in better condition to print, rollers on presses last longer because of the even temperature. The aluminum ceiling insulation which was left uncovered has not only reduced the cooling load but has also improved lighting conditions and reduced heating costs 40%.



How electronics makes P-K exchangers better than ever

This man is expanding tube ends into the tube sheet—the "inner face" of a shell and tube heat exchanger that holds each tube in place. By doing it electronically, with the equipment you see here, the circumference of each tube is joined to the face of the exchanger with exactly the same pressure.

This minimizes the possibility of leaks developing—even when a mile of tubing and hundreds of tube ends are involved, as they are in many of P-K's special exchangers.

But fabricating procedures like these are only part of the story. Every P-K unit is "computed" for its thermal rating and design.

This automatic check of a unit's thermal rating is not only a safeguard, but can often save you money. And it allows P-K to give a full and complete guarantee that each unit will perform at its rated heating or cooling capacity.

An increasing number of processors, engineers, and contractors have come to rely on P-K's painstaking fabrication and testing procedures —and their check, and double-check, of a unit's thermal rating. We would be pleased to design and build exchangers for you.

The Patterson-Kelley Co., Inc., 940 Burson Street, East Stroudsburg, Penna. Offices in principal cities.

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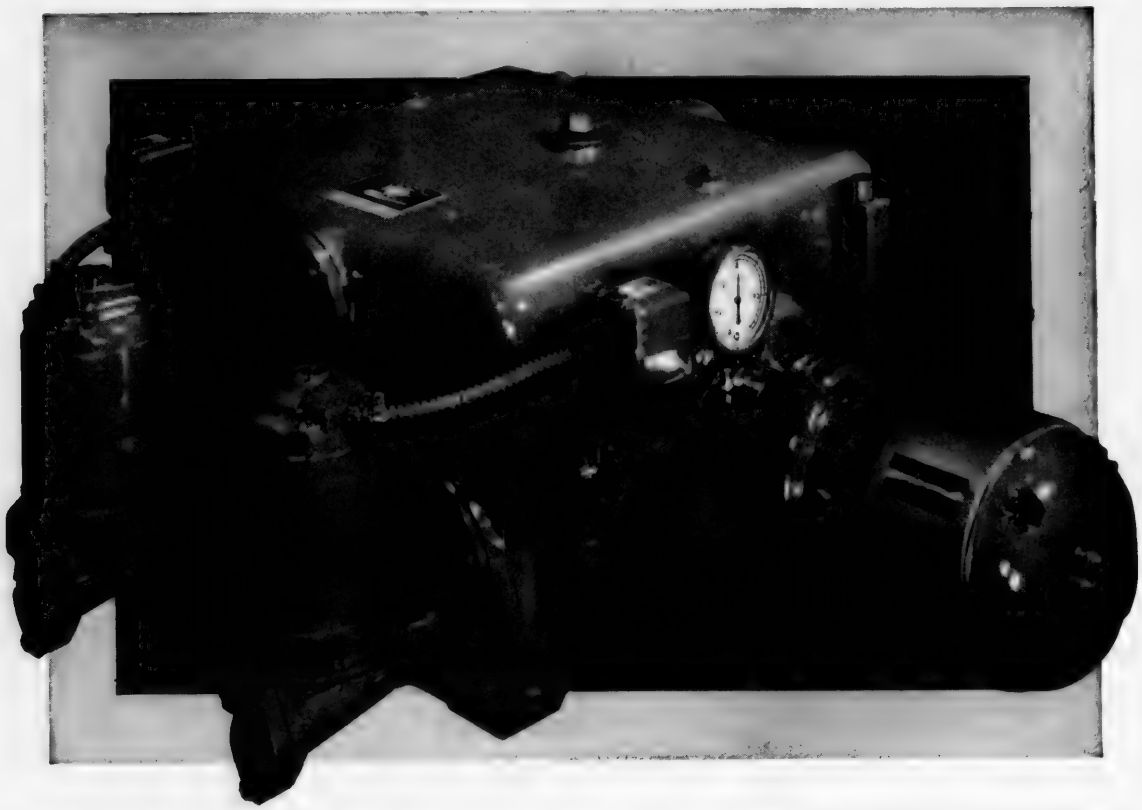
2592

Heat Exchangers • Converters • Storage Water Heaters • Condensers • Storage Chillers • Oil Heaters • and all types of heat transfer equipment

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



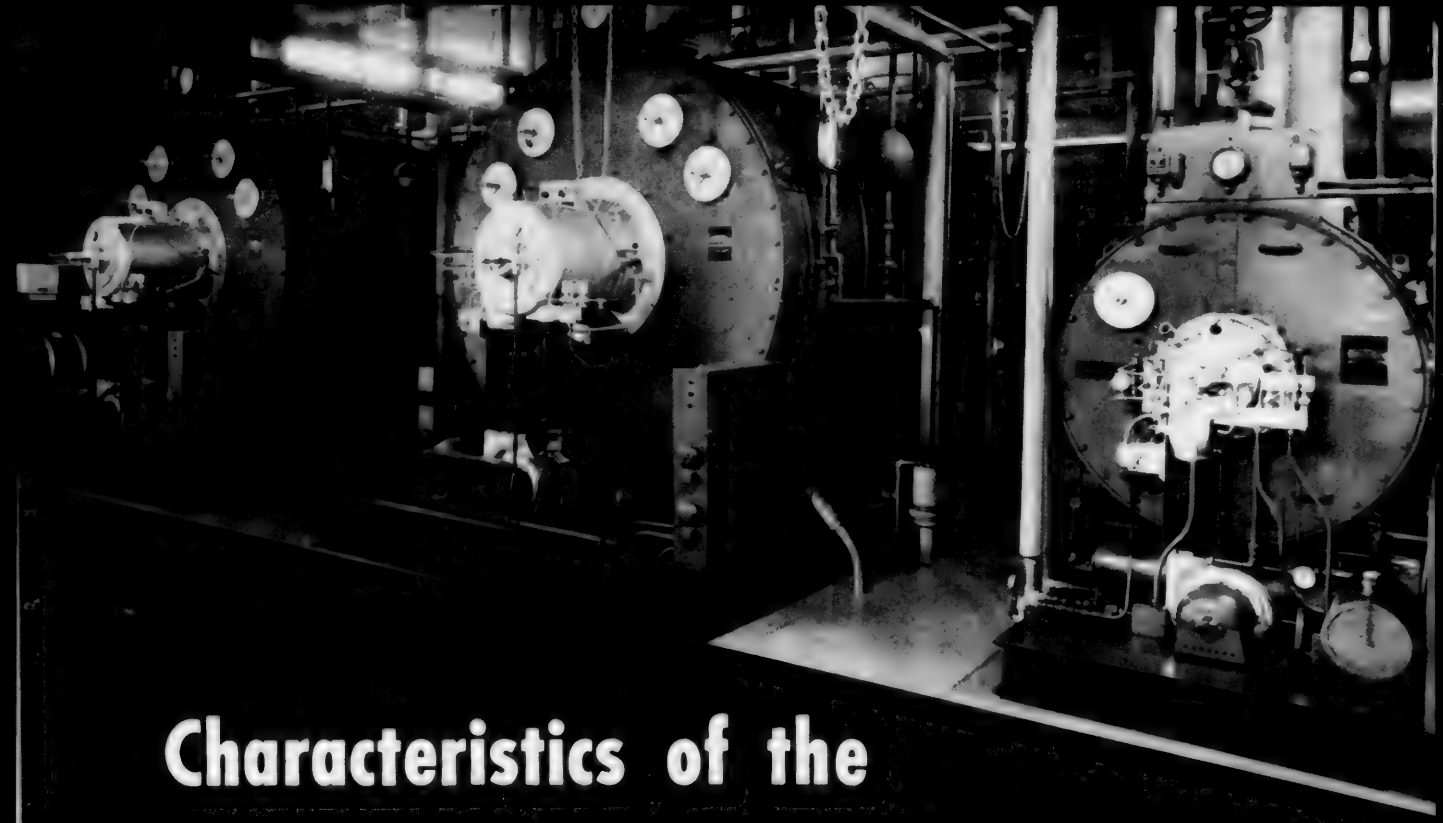
It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.



Characteristics of the PACKAGED AUTOMATIC BOILER

V. N. DeCERCHIO

Engineer, Orr & Sembower, Inc., Reading, Pa.

Those characteristics of packaged automatic boilers (sometimes called packaged steam generators) which bear upon their selection for process or comfort heating are described, and boiler sizing criteria are established.

PACKAGED automatic boilers are a relatively new development in the heating and power plant field having come into general prominence during World War II. With the tendency in modern design toward a minimum of boiler heating surface as a matter of economy, development hinged on the improvement of heat transfer by controlling flue gas velocities and water side circulation. This resulted in a compact rugged unit of high capacity.

Horizontal Return Tube Design

The packaged automatic boiler is essentially a horizontal return fire-tube boiler having a submerged internal furnace and incorporating the necessary trim, fuel handling equipment, burner, draft fan, feed-water handling equipment, and operating and safety controls. Liquid and gaseous fuels are burned since the use of solid fuels introduces additional complications of fuel and ash handling equipment, ash removal, and tube cleaning that were found difficult to reconcile with a design objective of a compact fully automatic single-unit boiler plant. However, recent research studies by the coal industry indicate some promise in solving these problems and due consideration should be given in selecting units in coal mining areas where the economies of coal may be realized.

The packaged automatic boiler is completely skidded and equipped with all accessories, as well as operating and safety controls. The entire assembly is firetested at the factory for proper operation of all components and controls. The only connections required for operation are to souces of water, fuel, and electricity and a stub stack for vent gases. The installation is sufficiently simple to be handled without extensive sub-contracting.

While maintenance costs are greatly reduced with the automatic package boiler by such features as easy access to both water side and fire side for inspection and cleaning, the automatic feature is occasionally oversold to the extent that even normal preventive maintenance practices are neglected. Certainly no manufacturer intends to imply continuous trouble-free operation without proper inspection, cleaning, water treatment, blowdown and other good operating practices.

The controls of packaged automatic boilers reduce the

operating attendance required in comparison with other methods of steam generation, and factory adjustment of fuel-air ratios results in cleanliness of combustion.

Boiler Design

The package unit boiler consists of three major components: the boiler and furnace unit, the burner, and the automatic controls, both operating and safety. The boiler includes an internal furnace which is a large diameter combustion tube located below the water level. There is usually some flame-shaping throat refractory at the burner location. Because of high first-pass temperature, rear refractory is required against which the products of combustion reverse themselves before returning through the multiple tubes making up the second pass. The entire internal furnace surface is black for greater absorption of radiant heat.

Fig. 1 illustrates typical 3-pass designs providing reasonable heat release rates and velocities of flue gas travel. With a single flow reversal of combustion gases at both front and rear, construction is relatively simple.

Steam quality is augmented by having maximum practicable steam release surface area that can be maintained with a relatively large steam accumulating volume above the boiler water line. Baffle plates or dry pans are installed beneath the steam nozzle to further eliminate entrainment of moisture. The standard guarantee of most manufacturers is for steam quality of 99.5%.

Operating and Safety Controls

There are normally three categories of operating controls. First, there is a combustion programming control which operates on a time cycle purging the combustion chamber on startup, programming the ignition and main fuel supply, and again scavenging the combustion spaces on shutdown.

Secondly, there is usually a modulating control adjusting both fuel and air automatically in exact ratio with steam demand thereby holding a constant operating pressure with high thermal efficiency (in excess of 80%). Smaller units are usually limited to simple on-off or high-low firing.

Finally, automatic water level control is provided to govern water supply to steam boilers, whether a makeup and condensate system is furnished by the boiler manufacturer or by the user.

A great deal of development has gone into control devices for monitoring or sensing the flame. In its simplest form this may be a heat actuated stack switch which shuts down the burner fuel supply when stack temperature drops indicating flame failure. However, electronic controls actuated by photo-electric or other flame sensitive cells detecting both the ignition flame and the main flame are more commonly used with industrial boilers. This type of control is connected to the programming control so that if the ignition flame is not established the main fuel supply remains closed. If the flame is interrupted during normal operation, the fuel supply is immediately shut off and the programming device goes into the post-combustion blower scavenging cycle.

A pressure actuated switch in the blower discharge must be closed indicating combustion air is being supplied before the burner program control can operate. Similarly, failure of the air supply will shut the burner down.

To permit smoother starting, boilers equipped with modulating controls, or with two-level firing rates, must start from the low fire position. This is accomplished by a limit switch held closed only in the low fire position. The programming control returns to low fire position after each shutdown.

Boiler water below a safe operating level again opens the burner circuit through the operation of a low water burner cutoff switch. The burner cannot be started until the normal operating water level is restored.

An excess pressure switch shuts the burner down completely on reaching some predetermined boiler pressure in excess of the normal desired operating pressure but short of popping of the safety valves. A similar excess temperature switch is used on hot water boilers.

Fuel Burners

Light oil firing is relatively simple with almost any type of burner. The high pressure mechanical atomizing burner is regularly used in small boilers burning light oil at a constant rate. It is not suitable for heavy oil nor readily adaptable for variable firing rates.

Heavy oil is more difficult to atomize and requires a different type of burner. Preheating of heavy oil is accomplished by a combination electric-and-steam or, in the case of hot water boilers, electric-and-hot water heaters. Electricity is relatively expensive for heating and is used only until steam or hot water is generated. A recirculating burner head permits the complete circulation of oil through the entire piping circuit right up to the nozzle until the oil temperature is increased sufficiently to permit ignition. Operation is automatic, the recirculating burner head valve opening to admit oil to the combustion chamber for ignition as soon as the oil temperature is sufficient to support combustion.

With improvements in compressor design, the use of compressed air for atomization is gaining wider acceptance in the burner field and its cost compares favorably with the cost of steam lost in a steam atomizing burner or the power needed for pressure atomizing. The air atomizing burner is particularly suited to variable load and has a wide capacity range without changing the burner assembly. Only about two per cent of the total full load combustion air is admitted with the oil for atomization which permits closer control of the combustion air to the boiler. The result is higher efficiency, even at light loads.

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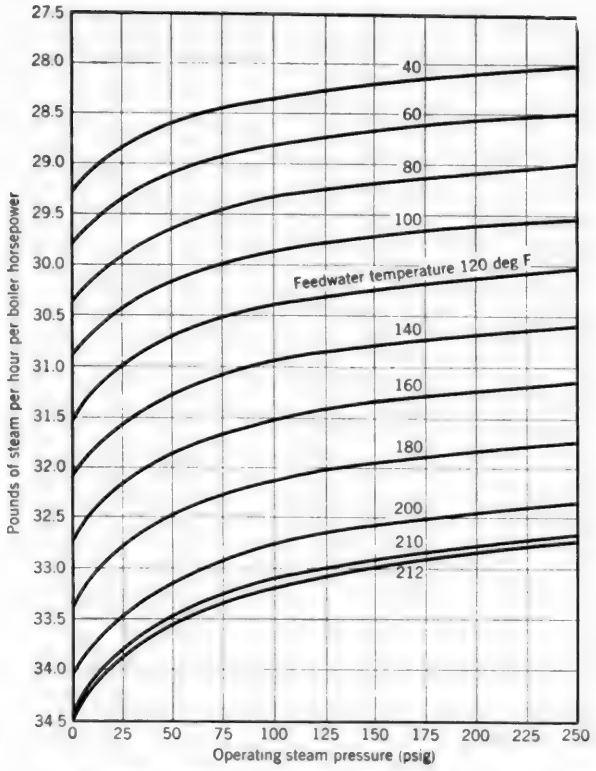

Fig. 2. Steam capacity at various feedwater temperatures.

Gas burners are relatively simple because the fuel reaches the burner under pressure and is already in a condition which enables it to mix readily with combustion air for smoother ignition. In pre-mixing designs, air and gas are thoroughly mixed enroute through the gas nozzle insuring quieter combustion.

Gas burners can be furnished in combination with either light oil or heavy oil burners for standby purposes. Quick convertibility of gas-to-oil and oil-to-gas should not be overlooked in the selection of a combination burner. The air atomizing oil burner seems to lend itself best to quick and simple interchangeability with gas.

Fuel/Air Ratio Control

Small packaged automatic boilers usually are limited to on-off or high-low operation to maintain steam flow within the required pressure limits. Larger boilers ordinarily incorporate some method of modulating the burner firing rate to accommodate variable steam demand. It is necessary, of course, that these intermediate firing rates be maintained at uniformly high efficiency by properly proportioning air and fuel to the burner across the entire operating range.

The desirable operating range over which the fuel and air ratio must be maintained for uniformly high efficiency above 80% is usually considered to be from 20% to 100% of full load. One simple mechanism consists of an adjustable cam which positions both the fuel valve and a linkage to the air damper. These adjustments are set and locked during factory fire testing after checking against actual flue gas analysis and stack temperatures at each of a large number of check points. Thereafter during actual operation wherever the damper motor positions itself, controlled by boiler pressure reflecting steam demand, the fuel/air ratio at that specific firing rate is correctly proportioned for efficient operation with correct CO_2 content and stack temperature of the flue gas.

Properly selected to handle occasional maximum loads, the boiler ordinarily will be operated at about 60% load. Full-firing rate efficiency may be considerably reduced in this lighter load range which may account for nearly all the operating cycle. This is particularly true if simple on-off firing or two-position high-low firing is selected. Continuous full range modulation is highly desirable from the standpoint of operating efficiency.

Sizing Boilers

Conventional firetube boilers of this general design are frequently sized on the basis of about two-thirds of their gross output as a nominal rating to compensate for line losses. Then they may be recommended for 150% firing rates which tend to cancel out any intended protective benefit. Usually no guarantees of efficiency and performance are made at this higher rating.

Packaged automatic boilers are normally rated on the basis of gross output in pounds of steam per hour, or Btu per hour for heating applications, at the steam nozzle. This figure is calculated on a "from and at 212 deg F" basis for the sake of uniformity. Makeup is rarely at 212 deg and must first be heated to 212 deg by the heat from the boiler. Also, steam is rarely generated at 212 deg and must be heated above 212 deg to steaming temperature at the boiler pressure. The accompanying graph (Fig. 2) permits easy conversion of actual pounds of steam required into "from and at 212 deg F" conditions. Under extreme conditions boilers in this range may put out only about 80% of their "from and at 212" ratings. For example, with feedwater at 40 deg as may be available on a 100% makeup installation in cold weather and in generating steam at 200 psi, the boiler output would be only 81.5% of the nominal "from and at 212 deg" rating.

No system of standard boiler overloading rating insures protection against unusual load or loss conditions. Connected loads must be accurately calculated together with all heat losses, and the proper boiler selected to deliver the maximum total steam demand under the most favorable conditions.

There are very few applications, other than large public utility central stations or industrial plants of similar complexity and high pressure design, where package unit boilers are not suitable for a steam supply, and even in those large establishments they are frequently used for building heating, coal storage thawing, and other auxiliary service. In large industrial plants, several package units located at the various points of steam utilization are increasingly preferred to a single central plant.

Modern automatic package units develop steam in a matter of minutes. Because of the relatively large water storage capacity, wide and sudden fluctuations in steam demand result in only very small changes in boiler pressure.

The burner is a most important component of the packaged automatic boiler. On its proper functioning depends in a large measure the efficiency of the complete unit, the amount and type of cleaning and maintenance of the boiler, and the general satisfaction and trouble-free operation of the entire installation.

Filters in Bacteriological Hoods

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Safeguards must be provided technicians who work with pathogenic bacteria in laboratories. One solution is the use of bacteriological hoods fitted with special filters so that the exhaust air discharged will not endanger persons nearby. Hoods designed for this purpose are described.

IN a bacteriological laboratory, working with tuberculosis organisms (mycobacterium tuberculosis), there is always a potential exposure of the technicians to the organisms and sometimes these laboratory workers have contracted tuberculosis. The Bacteriological Laboratory of the Virginia Department of Health recognized the hazard and gave considerable thought to ways and means of coping with the problem. Several commercially available hoods and local exhaust systems were investigated but none of them was found to afford an entirely satisfactory solution.

Finally the Bacteriological Laboratory requested the assistance of the Bureau of Industrial Hygiene to help solve this problem. It was decided that the Bureau would design an exhaust system with bacteriological hoods in which most of the tuberculosis culture work could be done. The task was not simply one of reducing the exposure of the workers engaged in the tuberculosis culture work. It was complicated by the fact that the air discharged from the system must be free of tuberculosis organisms. Due to the nearby location of offices, which use windows for ventilation, it did not seem wise to discharge potentially contaminated air directly outside the laboratory window. Because the laboratory is located on the sixth floor of a thirteen-story office building, it was judged impractical, both from the standpoint of expense and esthetics, to discharge the air through a duct extending a safe distance above the building roof.

Fig. 1. Laboratory technician looking through glass panel while working at bacteriological hood.

Details of Hood

The volume of work being done in the Bacteriological Laboratory of the Virginia Department of Health, made two hoods necessary. These hoods were designed of stainless steel and had all joints soldered to make them air tight and easy to clean.

The hoods are 4 ft wide by 2.5 ft deep by 3 ft high. The base, or floor, of each hood is fabricated of 1⅝ inches thick fir and covered with stainless steel. The front of each hood has an opening at the bottom through which the technicians are able to insert their hands and arms to perform their work within the confines of the hood. This opening is approximately one foot high and 4 ft wide (the width of the hood). From the top of the opening the face of each hood slopes upward to the rear as shown in Fig. 1. The sloped face of each hood consists of two glass panels, the upper one fixed and the lower one hinged. The lower hinged panel enables technicians to have access to the inside of the hood for cleaning the hood and changing the filter.

Two fluorescent lighting fixtures are mounted inside each hood. One fixture is attached to each side panel with its long axis parallel to the sloping front of the hood. The fixtures, equipped with adjustable reflectors, are mounted near the front of the hood to flood the interior with light. The reflectors are adjusted to keep the light out of the eyes of the technicians. An ultra-violet light fixture is mounted on the inside surface of the top of each hood, and to avoid possible eye injury, these ultra-violet lights are turned on only at night when no one will be in the room.

Supports

Each hood is mounted on 2-inch pipes with flanges so that the ends can be firmly secured to the base of the hood

Fig. 2. Special filter removed from the bacteriological hood. Note stainless steel mounting frame, fluorescent light reflectors, and raised position of hinged panel. Photos courtesy Mine Safety Appliance Co.

and to the floor. One of the four pipes, or supports, is located under each corner of the hood. The working surface of each hood is at a height which permits the laboratory worker to sit comfortably on a stool and perform the necessary operations within the hood. The exhaust opening in the top of each hood is 24 inches long and 7 inches wide. Attached to each of these openings is a transformation which connects to a 7-inch diameter duct. The 7-inch ducts join to form a 9-inch duct which is connected to the fan inlet. Since it is impractical to run an exhaust duct to the roof of the building, it was decided to terminate the discharge duct from the fan outside one of the sixth story windows.

Special Filter

The use of a filter seemed advisable to prevent organisms from being discharged through the exhaust system. After some investigation it was decided to use the special asbestos bearing paper filter developed for the Chemical Warfare Service during the war. The same type filter was later used by the Atomic Energy Commission to remove radioactive particles from the air. The construction of the asbestos bearing paper filter as well as its high efficiency was a major factor in its selection.

The accordion-pleated separators in the filter leave a minimum of blocked-off and unused area. This assures a lower velocity of air through the filter material for any given rate of air flow than would be possible if the separators were made of conventional rounded corrugated board which makes a flattened contact with the filter paper instead of a creased edge contact. High initial efficiency, low initial resistance to air flow, low velocity of air flow through the filter media and high loading capacity are obtained in this type of construction. Filters of this type have shown an efficiency of 99.95% for particles as small as 0.3 of a micron in diameter. Since the size range of the tuberculosis organism is 0.3 to 0.6 by 0.5 to 4.0 microns, these filters will retain such organisms and prevent them from being transported through the ductwork and discharged outside the window.

One of these special filters is installed at an angle against the back of each hood by means of a stainless steel mounting frame. The steel frame was designed and fabricated so as to enclose the wooden frame of the filter and to compress the sponge rubber gasket on the front and back faces of each filter to make the assembly air tight. In addition, the lines of contact between the stainless steel mounting frame and the inner surfaces of the hood were sealed by soldering. These precautions were taken to make it virtually impossible for any air within the hood to bypass the filter.

Air Movement

The exhaust systems were designed to provide a minimum air movement of 100 linear feet per minute through the face opening of each hood or a total air movement of 800 cfm through both hoods when the filter is loaded. The size of the standard filter selected, Fig. 2, is 24 in. by 24 in. by 5⅞ in. thick. Its capacity is 500 cfm. Thus, the design velocity through the filter is slightly less than its rated capacity. The room in which the hoods are located is relatively small so it was necessary to make some provision for obtaining make-up air from the hallway. To reduce the dust load from other sources to a minimum and thereby prolong the effective life of the hood filter, and also to prevent contamination of the tuberculosis cultures, an ordinary throw-away filter was inserted in the door leading from the hall. A manometer, or U-gage, is installed on each 7 in duct so that the resistance through each hood and filter may be known at all times. Furthermore, the U-gages indicate when filters should be changed. Since these filters are relatively expensive, a few months added use of the filter repays the cost of the U-gage installation. A suggested location for the gage is shown in the illustration on the front cover of this issue.

In the design of the system it was decided to use a duct velocity of 1500 fpm. The resistance caused by the loaded filters was assumed to be 2 in. w.g. From calculations, the total resistance or static pressure in the system, with loaded filters, was 2.63 inches of water. The initial face velocities through the hood were measured and were found to vary from 125 to 135 fpm. The first filters were changed after 1½ years of continuous use.

A belt-driven centrifugal fan is employed in the twin hood system. The selection of this type fan was governed by the need for reasonably quiet operation.

Thus far, twin bacteriological hoods have been installed in the Laboratory of the Virginia Department of Health and a single bacteriological hood has been installed in a branch laboratory. The twin hoods have been operating for two years and the other one for over a year. These installations have been very satisfactory. The only criticism received has been regarding obstruction of vision caused by the lower edge of the frame of the hinged portion of the twin hoods. For technicians of short stature, the size and location of the frame causes some obstruction of vision, as can be seen in Fig. 1. This was corrected by using a narrower lower edge on the other hood.

The chief advantages of this type of bacteriological hood are: (1) a barrier of glass between the face of the technician and the operation, (2) a flow of air away from the operator into the hood and (3) a filter to remove infectious organisms from the exhausted air. The Bureau of Industrial Hygiene of the Virginia Health Department has received numerous requests for assistance in planning and designing additional bacteriological hoods.

How Higher Courts Have Ruled

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Cases decided by the higher courts, of interest to heating contractors and manufacturers, are reviewed in this article. The cases are briefly described and the essence of the legal opinion stated. Similar court cases are listed.

THE higher courts in different localities have rendered several outstanding decisions involving heating contractors, manufacturers, buyers and sellers of heating appliances and equipment. Knowledge of the cause and outcome of these new decisions will assist readers to avoid future heavy damage allowances. Obviously, readers and their lawyers may advantageously cite and use the hereinafter new decisions to win unavoidable law suits. Also, recently the writer received interesting legal questions and problems that normally confront readers. Some of these questions will be answered in this article, as based on late and leading higher court decisions.

When Patent Is Valid

First, I shall answer an interesting letter from a dissappointed inventor. He wrote, as follows: "I am a dealer in heating appliances and supplies. Sometime ago I applied for and was given a United States patent for a new improvement on a furnace. A few weeks ago I learned that a company in the East is manufacturing and selling my exact invention. I went to see a lawyer intending to sue this corporation for infringement of my patent. This lawyer told me that it would be useless for me to file the suit because I cannot win the case. He said the "claims" in my patent will not win the suit for me. In my drawings and, also, my specifications is shown and described exactly what this infringing company is manufacturing. Why can't I sue and get damages from this company for infringement? I spent over $500 to get my patent and what good is it if another company can go ahead and make my invention without paying me royalties?"

This unfortunate inventor is having the same disappointment numerous other inventors and patentees have experienced in the past. This is so because a patentee has absolutely no protection against any person or company making and selling what is shown in the drawings, and explained in the specifications and descriptive matter of the patent. In other words, an inventor is protected only by the "claims" in his patent. Numerous higher courts have in the past laid down and upheld this law, and last month a higher Federal court sustained this usual law in a case involving oil filters.

For example, in Winslow Engineering Company v. Smith, 223 Fed. (2d) 438, the testimony showed that an inventor named Winslow obtained a patent on a filter for fuel oil used in connection with heating equipment and engines. One of the problems confronting present day manufacturers of filters was their tendency to clog or fill up within a limited time, and thus require frequent replacement. Winslow undertook to bring together a combination of old parts but in such a manner as to provide a filter element which would extend the life of the oil filter and postpone the time when the pores in the filter surface would slick over until the absorbent filtering material behind the filter surface had been completely filled with this foreign matter.

Briefly, Winsow's patent is cylindrical in shape and contains a filter with a porous knitted sleeve of fabric. As the impurities and foreign matters in the oil pass into the filtering material the knitted openings gradually become larger permitting more and more of the solids in the oil to pass through and lodge in the interior filter. Although all of the elements described by Winslow were found in different old and prior patents, the higher court held Winslow's idea of combining these old elements was patentable saying:

"This combination presented a growth factor accompanied and supplemented by the expanding of openings in a filter cloth to allow that growth to continue and to prevent slicking over until maximum utilization of the interior filter mass had been accomplished. Hence we think invention was here present. Thus we have invention . . . It measures up to the standards for invention which this court has previously had occasion to approve."

Nevertheless, the higher court held the patent invalid and not infringed because none of the claims in the patent contained a clause explaining that when the casing expands it stretches the knitted cover making the holes larger through which the oil passes and thus delays the time required by the usual filter to become plugged with foreign matter and not useful to filter the oil. The court said:

"The claim does not allude to the growth or expansion of the filtering material; nor is there any allusion to any knitted fabric."

This court explained that although the drawings and specifications clearly showed and explained the porous "knitted sleeve of fabric", yet the inventor has no protection against infringement of his patent. In this respect, the court said:

"It is true that the specifications when read with the drawings, if added to or incorporated in these claims would accomplish the required limitation necessary to specify the combination constituting the invention."

Patent Claims Held Invalid

In order that an inventor may obtain valid claims in a patent, he must produce something new. The mere

carrying forward of an old idea involving a change only in form, proportion, or degree is not a patentable invention.

For example, in United States Air Conditioning Corp. v. Governair Corp., 216 Fed. (2d) 430, it was disclosed that an inventor named Wilson obtained a patent No. 2,297,928 for a composite air conditioning unit in which the water pump and compressor are driven by a single motor. After several years of litigation the higher Federal Court held this patent invalid, saying:

"The mere aggregation of a number of old parts or elements which, in the aggregation, perform or produce no new or different function or operation than that theretofore performed or produced by them, is not a patentable invention. We are further of the opinion that what Wilson conceived would have been obvious to a person having ordinary skill in the art to which the subject matter of his patent pertains. Accordingly, we conclude that the claims in suit are invalid for want of invention."

For further comparison, see Application of Marvin, 222 Fed. (2d) 271, decided recently. In this an inventor applied for a patent on a remote control system energized by a source of electrical potential for controlling automatically the operation of a household furnace. The invention is as follows: A time switch is connected in a circuit with day and night thermostats for connecting the day thermostat in circuit with the furnace control means during the day, and the night thermostat in circuit with the furnace control means during the night, so that the furnace is under the control of the day thermostat during the day and night thermostat during the night. Instead of having the thermostatic control device connected to the furnace control means through wires, it is connected to the furnace control means through a radio transmitter and receiver. The closing of the switch controlled by either the day or night thermostat, depending upon which one is connected in the control circuit by the time switch, energizes an oscillator which transmits radio frequency energy to a receiver located adjacent to the furnace. The radio frequency energy received by the receiver operates a relay which in turn operates the furnace control means.

The United States Court of Customs and Patent Appeals refused to allow any claims because one old patent used a radio relay signal to notify of increased temperature of fire at a distance, and other prior patents used specific temperature responsive system for opening and closing a circuit to an electromagnetic relay controlling a furnace.

Contractor Failed to Get Permit

According to a late higher court decision a heating contractor can sue and recover payment for work performed, although he did not comply with a state law requiring him to obtain a permit to enable him to do the work.

For example, in Pflugradt v. Neth, 69 N. W. (2d) 477, it was shown that a heating contractor, named Pflugradt, filed suit to foreclose a mechanic's lien in amount of $1,390 upon the proprietor for the installation of a heating plant. The property owner claimed that the contractor could not recover payment for his work because he never obtained a permit in compliance with the statutes of the State of Wisconsin to perform the work, and without having obtained authorization from the Industrial Commission of the State of Wisconsin.

The higher court refused to hold the lien invalid on these grounds, and said:

"What defendant (property owner) asked us to do is to penalize a contractor for failing to comply with an order which has nothing to do with the performance of the work."

Cannot Recover Extra Payment

Recently a higher court held that a heating contractor cannot recover payment for extra work, unless he proves that the property owner or the general contractor, or an authorized agent, ordered the extra work to be performed.

For illustration, in Bearden Plumbing & Heating Company v. Smith, 274 Pac. (2d) 1015, the testimony showed facts, as follows: A general contractor named Smith, took a contract to construct a city hospital. Later Smith made a contract with the Bearden Plumbing & Heating Company for installation of plumbing, heating, and air conditioning systems in the hospital for $64,000. Subsequently and while the construction was under way, the city asked for bids on construction of additions and extensions to the building. Before making a bid thereon Smith requested a bid from Bearden Plumbing & Heating Company for the additional plumbing required. The latter submitted a written bid of $1,235 on the work, which bid was accepted by Smith.

In the progress of the work on the original structure, the Bearden Plumbing & Heating Company was directed by certain employes of Smith to proceed with that project. The former objected on the ground that the bid of $1,235 on the new work was dependent upon constructing of the two projects simultaneously. Otherwise, to complete the first and then make the changes necessary would make the expense much greater. However, he was prevailed upon to complete the original job upon the promise of some of Smith's employes that the additional expense would be paid for by Smith.

In subsequent litigation, the higher court held that the Bearden Plumbing & Heating Company could not recover payment for the extra work, saying:

"Regardless of the manner or time of performing, plaintiff (Bearden Plumbing & Heating Company) was bound under the terms of his contract to do the work for a certain price. The fact that defendant's (Smith's) employes induced him to perform the work at a time which caused additional expense does not change the situation. The plaintiff was at liberty to refuse to comply with any request or direction of an employe if it was outside the terms of his written contract."

For comparison, see the case of City of Dallas v. Shortall, 114 S. W. (2d) 536. The higher court held a contractor who agrees to do for a fixed sum, work possible to be performed will not be excused or become entitled to additional compensation, because unforeseen difficulties are encountered.

Janitor Is Incompetent

Recently a higher court held that a property owner is solely liable for damages caused by his incompetent employe, although heating contractor may have told the incompetent employe what to do.

For instance, in Kaufmann v. Griffith-Consumers Company, 222 Fed. (2d) 450, the testimony showed facts, as follows: The Griffiths-Consumers Company, a heating contractor, contracted to convert the heating and hot water system of an apartment building from coal to oil. Before the contractor's work was completed one of the three boilers, which formed part of the system, exploded shattering adjacent structures and causing personal injuries and property damage to tenants and other persons. Thirteen suits for damages were filed against the owners and the contractor.

During the trial, testimony was given that the janitor kept only one boiler in active service during the work of conversion, in order to supply hot water to the tenants. The explosion was caused by the act of the janitor of the apartments, who sealed the boiler by closing all of the valves by which water entered and flowed from the boiler, but left a fire burning under it.

Although it was contended that the contractor instructed the janitor to turn off the boiler, the higher court refused to hold the heating contractor liable, and said:

"The evidence fully sustains that the owners of the building were guilty of negligence. The lower court found not only that Anderson (janitor) was incompetent and had no idea that he had put Boiler No. 1 in a fair way to explode, but also that the safety valves on top of the boiler were not only inadequate but were rusted and frozen."

With respect to the apartment building owner's argument that the heating contractor was liable because he directed the janitor to cut off the boiler, the court said:

"Throughout the conversion (janitor) was in charge of the boiler room for the owner and retained control of Boiler No. 1 in order to serve the tenants. This service, involving the manipulation of the valves and of the stoker switch, was clearly within the scope of his regular service and he took no orders from the contractors in regard thereto. He was in no sense the servant or agent of the contractor."

Validity of Exclusive Agency Contract

A reader asked this question: "Is an exclusive agency contract for heating equipment valid, or does it violate the anti-trust laws? I have an exclusive agency to sell and install a certain make furnace in the county where my business is situated. I have been warned that the contract is unlawful. Please give me some late decisions for reference to my lawyer."

Last month a higher court rendered an important decision pertaining to the validity of exclusive agency contracts, and particularly the Clayton Act. This latter Act provides that it shall be unlawful for any person to make a sale, or contract for sale of merchandise, whether patented or unpatented on the condition or understanding that the purchaser shall not use or deal in the merchandise of a competitor, if the effect of such sale substantially lessens competition or "tends to create a monopoly" in any line of commerce.

For illustration, in Campbell v. The Automatic Die & Products Company, 123 N. E. (2d) 401, the testimony showed the facts, as follows: A man, named Campbell, owned a patent on a heating device. He made a written contract with a corporation which contained a clause to the effect that the corporation would not make or sell any similar device and would not engage in any similar business. The purpose of the contract was to give the corporation the exclusive right to manufacture and sell Campbell's patented device on an agreed royalty payable by the corporation to Campbell. Due to unforeseen circumstances the corporation did not manufacture or sell any of the heating devices, and Campbell sued the corporation for breach of the contract and damages. The corporation's counsel attempted to avoid liability on the contention that the "exclusive" clause in the contract violated the Clayton Act and rendered the contract void. However, the court awarded Campbell $5,000 damages holding the contract not unlawful, and quoted:

"It is essential that the contract be operative to foreclose competition in a substantial share of the line of commerce affected. In the instant case, not only were no facts found but no evidence was offered to indicate that this contract was operative to foreclose competition in any degree, let alone to the extent of a 'substantial share of the line of commerce affected'."

For comparison, see Kay Petroleum Corporation v. Piergrossi, 79 A (2d) 829. Here a purchaser and a corporation entered into an "exclusive" sales contract whereby the purchaser for a specified number of years agreed to purchase from the corporation his entire supply of gasoline and oil to be used or sold at his various gasoline service stations. The purchaser breached the contract and the corporation brought suit to recover damages.

The purchaser claimed that the contract was violative of Section 3 of the Clayton Act because the contract contained the restriction that the purchaser would not deal in the gasoline and oil products of any seller, other than the corporation.

The higher court held the contract valid and also held the purchaser liable in damages to the corporation for breaching the agency contract.

For further comparison, see Pick Manufacturing Company v. General Motors Corporation, 299 U. S. 3. Here it was shown a purchaser agreed in writing that he would not sell or offer for sale any repair parts not manufactured by the seller.

Both the United States District Court and the United States Circuit Court of Appeals held that the effect of this clause had not been to substantially lessen competition or to create a monopoly in any line of commerce and rendered a decision in favor of the manufacturer and seller. The Supreme Court of the United States affirmed the decision.

When Manufacturer Can Cancel

Another reader asked this question: "Can a manufacturer without liability cancel a dealer's agency contract, although a state law prohibits cancellation?"

Fortunately, I located a higher court case decided in July, 1955 which answers this question in the affirmative.

First, it is important to know that the Supreme Court of the United States has many times in the past held that the right of free conract is one of the inherent rights guaranteed to the citiens by State Constitutions as well as by the United States constitution. In other words, the right to contract is a property right protected by both the state and federal consitutions.

For example, in Kuhl v. Ford, 71 N. W. (2d) 420, the testimony showed facts, as follows: A law in the state of Wisconsin provides that it is unlawful for a manufac-

turer to cancel an exclusive agency contract or franchise without due regard to the equities of the dealer and without just provocation. Also, the state law provides heavy penalty for violation of this law by a manufacturer.

A wholesale and retail dealer entered into a written sales agreement with a manufacturer which provided that the contract could be terminated at any time at the will of either party by sixty day's written notice. After handling the merchandise and equipment for 16 years, the dealer received from the manufacturer a notice of its intention to terminate the agreement. The dealer filed suit and asked the court to grant an injunction to prevent the manufacturer from cancelling its franchise or agency contract. The higher court refused the injunction, quoting:

"The agreement in this case was not for a fixed period but was terminable at any time at defendant's (manufacturer's) will upon compliance with the requirement as to notice. It is beyond the power of the judiciary to engraft conditions upon the exercise of such a contractural right. This is a business contract . . . its purpose the mutual economic benefit of both dealer and manufacturer. An inequality of bargaining power is present in many contractual relationships, but the law does not attempt to equalize it by impairing the basic right to contract."

Need Not Keep Detailed Books

According to a late higher court decision, a heating contractor need not keep a set of detailed books to recover money claimed to be due him.

For illustration, in Joslin v. Cook, 67 N. W. (2d) 56, the testimony showed facts, as follows: Joslin is engaged in the business of installing warm air furnaces. The Cook Furnace Company sells warm air furnaces, and entered into agreement with Joslin whereby Joslin should install furnaces for the Cook Furnace Company.

In doing various jobs of installation of warm air furnace or other jobs involving work and materials Joslin failed to keep detailed books, but from records the lower court determined that the Cook Furnace Company owed Joslin $1,200, which debt the Cook Furnace Company disputed. The higher court upheld the lower court's verdict, and held:

"In action for the balance claimed to be due plaintiff (Joslin) for labor and materials furnished in installing warm air furnaces sold by defendant (Cook Furnace Company), plaintiff (Joslin) established his claim by preponderence of evidence.

Minor Not Responsible

Modern higher courts consistently hold that a minor need not fulfill the terms of his contract. Also, according to a late higher court decision, although a minor falsifies his age, when buying heating appliances, he can rescind the contract.

For illustration, in Barnes v. Rebsamen, 255 S. W. (2d) 961, the testimony showed these facts: One Barnes purchased certain equipment. At the time of the sale Barnes misrepresented his age to the seller, and again falsified his age when he obtained a marriage license a few weeks later. In both instances Barnes represented that he was 22 years old, when in fact he was a minor.

The higher court ordered the seller to repay to Barnes all the money he had paid. Furthermore the higher court refused to hold Barnes liable for any payment, rental, use or depreciations of the equipment.

When Contractor Is Liable

Recently a heating contractor wrote: "I have had several suits involving explosions of gas appliances which my employes connected up. Sometimes the design of the home is the real cause of the explosion. What rule of law is applicable to such a situation?"

Last month a higher court rendered an important decision which clearly answers this question. For instance, in Evans v. The Nashville Gas Company, 264 S. W. (2d) 577, the testimony showed that a contractor took a contract to supply certain materials and appliances and to perform certain alteration work in a dwelling. The contractor installed a gas water heater in a small closet beneath a stairway. The local gas company made an inspection of the premises and connected the gas system of the house with its regular lines. After the inspection the gas company's employes lighted the pilot light of the gas heater. Sometime later an explosion and fire occurred in the closet space where the heater was located. The explosion was caused by the accumulation of gas in that space as a result of improper and incomplete combustion, which in turn, was caused by a lack of oxygen in the enclosed space where the heater was located.

Evans, the home owner, sued the contractor, who sold and installed the heater, for heavy damages.

It is interesting to observe that the higher court refused to hold the contractor liable, saying:

"The vendor (seller) does not owe to the purchaser the duty to disclose to him dangerous conditions of premises. Whatever may be the reason, no case can be found in the books where the vendor has been held liable in damages to the purchaser for personal injuries arising from defects in the premises."

For comparison, see Cleveland Gas Company v. Woolen, 205, S. W. (2d) 754. The facts of this case are that there was an explosion in an old gas heater, because it had no automatic cutoff.

In this case the contractor and seller of the heater had actual knowledge of the defective condition of the gas heater. Therefore the higher court held the contractor liable in heavy damages for the explosion.

Effects of Moisture on Heat Flow

Tests undertaken to measure the effects of moisture on heat flow through building materials were described by K. R. Solvason, assistant research officer, Division of Building Research, National Research Council, Ottawa, Canada, in a paper titled "Moisture in Transient Heat Flow," presented before the ASHAE at its recent meeting in Cincinnati.

It was concluded that the magnitude of the variation in the heat flow pattern produced by the presence of moisture in an actual wall would appear to depend on (1) amount of moisture present, (2) imposed temperatures and vapor pressures, (3) moisture-sorbing and moisture transmission properties of the materials, and (4) heat transmission properties and arrangement of the materials.

Centrifugal Pump Application

Part 3 – Pump Heads, Discharge Conditions

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The various components of the total head acting upon pump discharge are described and added to suction heads to determine overall total head. This article is third in a five-part series on factors in centrifugal pump selection.

THE discharge head of a centrifugal pump (symbol h_d) is the head measured at the discharge nozzle of the pump and can be expressed either in absolute or in gage readings. A gage connected to the pump discharge will indicate the discharge head minus the velocity head at the point of attachment, when the reading is corrected to the pump centerline.

The discharge head in a pumping system is the algebraic sum of the static head, the friction head losses for the capacity pumped, the exit loss at the end of the discharge line and the terminal head or pressure, expressed in feet of the liquid pumped.

The established practice is to express the discharge and suction heads of a horizontal pump with the centerline of the pump as the datum line. If the pump is vertical, the centerline of the discharge is usually used as the reference datum line. While other elevations can be used as datum lines, it is necessary to indicate at what datum the discharge and suction heads are measured in such cases. The reason for selecting such other datum lines arises from the fact that in a number of cases, the elevations of the pump centerline or of the discharge centerline may not have been determined before the selection and purchase of the pump.

Typical Discharge Systems

Some of the most typical discharge systems are illustrated in Fig. 12.

Case 1 shows a system in which the pump delivers to an elevated tank in which a pressure other than atmospheric exists (either above or below atmospheric) and this system includes *all* the components of discharge head.

Case 2 is similar to Case 1, except that the tank is open and atmospheric pressure exists on the discharge liquid level. In this case and those which follow, if the discharge head is to be expressed as a gage reading, P_d is zero and is therefore not shown in the formulas. If the discharge head is to be expressed in absolute values, the atmospheric pressure, expressed in feet of the liquid pumped, is added to the discharge head expressed as a gage reading.

While Case 3 illustrates an overhead tank, it applies to all cases of "overboard discharge." The actual useful static head (the distance from the pump centerline to the discharge water level) is less than the actual static discharge head D. It is possible, however, to recover part if

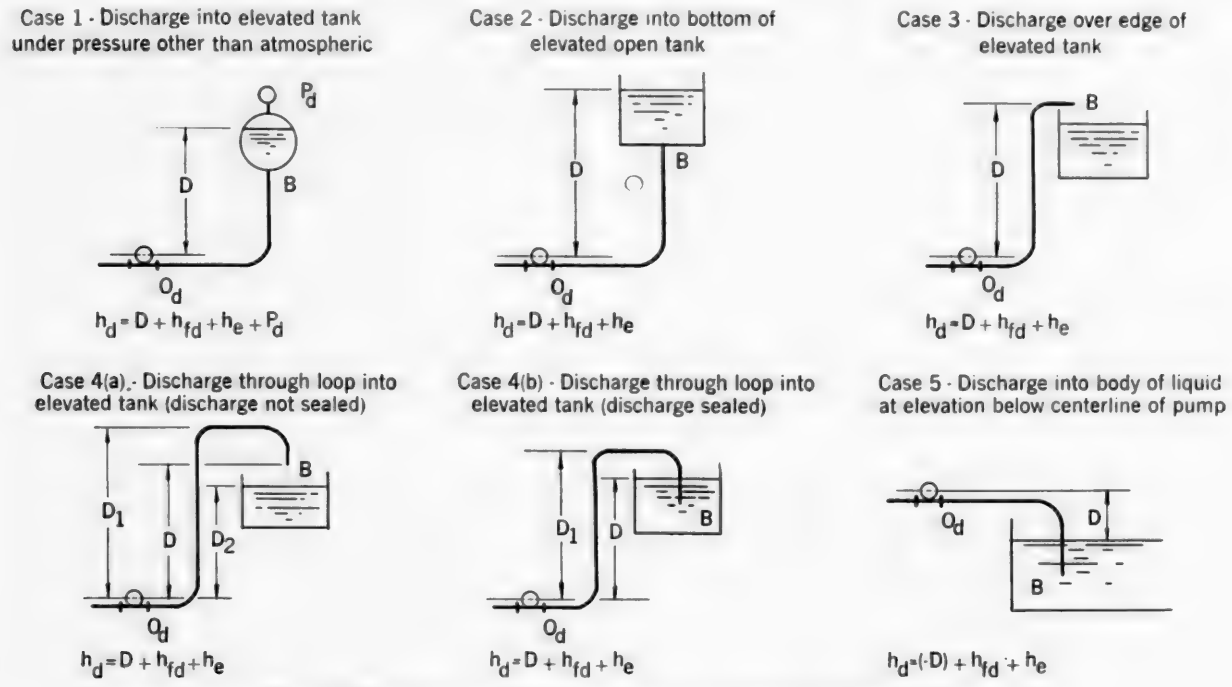


Fig. 12. Determination of discharge heads for six typical discharge layouts.

not all of this by incorporating a siphon leg (see illustrations for Cases 4a, 4b, and 5) on the discharge. While Case 4b and Case 5 would theoretically be the most efficient, it is often desirable for other reasons not to use a sealed discharge. One reason is to prevent the possibility of a back-syphonage when the pump is stopped.

In Cases 4a and 4b, a siphon leg is involved and the effectiveness of the siphon will depend both upon the length of the siphon leg and the design of the piping. Varying with the design, the recovery could be anything from 0 to 100%. For example, in Case 4a, if the pipe were very large for the capacity, the pipe would not run full and, as a result, the actual static discharge head would be the distance to the existing (actual) water level in the loop of the piping. All cases involving a siphon leg have to be investigated carefully to see what percentage of head recovery can be expected and the loss included in the friction loss (h_{fd}).

As the absolute pressure at any point in a siphon must be in excess of the vapor pressure of the liquid, it is theoretically possible to have a siphon leg approaching 34 ft at sea level only if the water is cold and air free. In most cases, the water is not air free and a reduction in pressure below atmospheric causes some separation of this air thus reducing the effectiveness of the siphon. With water, siphons more than 20 ft high are rarely encountered. It is also questionable if many of those even under 20 ft are 100% effective.

In the use of syphons it is necessary that the design be such that air entrapped will be forced out when operation begins so that the siphon is promptly established. It is also to be noted that, unless the air in the loop can be evacuated, the pump will have to operate during the starting period against a maximum static component indicated as D_1—see Case 4b. In some condenser circulating installations, this results in a much higher starting head than the normal operating head and special consideration has to be given to the characteristic of the pump. This can also be true in Case 1 if P_d is a negative pressure which is not established until after pumping has commenced, as in the case of a barometric condenser.

In systems where there is a variation in some element of the discharge head, it is generally advantageous to establish the discharge head at various capacities and prepare a graph showing the head variation with capacity. When combined with the suction head, the resulting chart indicates the system head.

Specifying Discharge Head

The discharge head, which determines the design conditions for a pump, should be stated with the understanding that it is generally composed of static elevation (or pressure) and frictional losses in the discharge piping and that any variations in the static head must be known in order to determine the maximum and the minimum head against which the pump is to operate. Specifying an excessive total head has actually the same effect as specifying excessive capacity. Since a centrifugal pump will always operate at the intersection of its head-capacity curve and of the system-head curve, a pump which develops an excess of head will, unless artifically throttled, deliver an excess in capacity as its curve will intersect the system-head curve at a greater flow.

By breaking up the discharge head into static and friction head, it is easily seen whether the friction losses are excessive. If the piping to be used is too small, the required pump and its driver (motor or engine) will be more expensive than necessary and the cost of operation greater than if the proper size pipe were used. As a rule of thumb, the friction losses should not be more than 10 to 20% of the static head for comparatively short pipe lines.

When the total cost involved is high and justifies an extremely detailed analysis, it is possible to determine the most economic size of pipe by plotting the sum of the amortization of initial pump, driver and piping cost and operating cost, versus the initial cost and amortization of various pipe sizes.

In certain special applications, the pump may for short periods be required to develop discharge pressures in excess of the design conditions. A typical example is a condenser water circulating pump which is to be installed in a system utilizing a siphon effect. The head to be developed consists only of the frictional losses through the piping and through the condenser itself and is therefore of fairly low magnitude. However, in order to enable the condenser circulating pump to deliver water through the condenser, it is necessary to prime the system (in other words, to discharge water over the siphon) and the design of the pump must be such as to permit it to develop a head at shut-off considerably higher than the normal operating head.

Nomenclature of various heads expressed in feet of fluid flowing and with reference to Fig. 12 and 13, are as follows:

h_d = total discharge head
D = discharge elevation
h_{fd} = friction loss from pump outlet to pipe outlet
h_e = exit loss at pipe outlet
P_d = pressure (other than atmospheric) on discharge fluid surface
P_s = pressure (other than atmospheric) on suction fluid surface
h_s = total suction head
H = total head = $h_d - h_s$
h_{fs} = friction loss in suction line
h_i = entrance loss to suction line
S = elevation of suction fluid
$H_{st} = D - S$
P_{vp} = vapor pressure of liquid

Some engineers include h_i and h_e in h_{fs} and h_{fd}.

Suction head: $h_s = S - h_{fs} - h_i + P_s$

Discharge head: $h_d = D + h_{fd} + h_e + P_d$

Total head: $H = h_d - h_s$

$= H_{st} + h_f + h_i + h_e + (P_d - P_s)$

$NPSH = S - h_{fs} - h_i + P_s - P_{vp}$

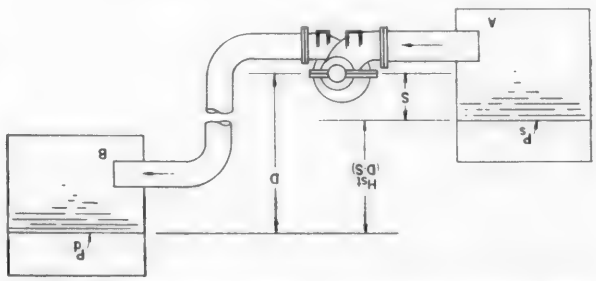


Fig. 13. Components of general formulas for head calculations.

Total Head

The total head (symbol "H") of a centrifugal pump is the energy imparted to the liquid by the pump. It is the difference between the discharge head and the suction head. Thus, as a suction lift is a negative suction head, the total head is the sum of the discharge head and the suction lift. If the discharge head and the suction head are not determined independently, the total head can be calculated by determining the algebraic sum of (1) the static head from supply level to discharge level, (2) all friction losses for the capacity being considered, (3) the entrance and exit losses, and (4) the terminal pressure minus the suction supply pressure. For complex systems involving both vacuums and pressure, it is often easier to convert all the various vacuums and pressures in absolute pressure values expressed in feet of the liquid being handled.

When measured by gages attached to the pump suction and discharge openings the total head is the discharge head (the sum of the discharge gage reading corrected to the pump centerline and the velocity head at the point of attachment of the discharge gage) minus the suction head (the sum of the suction gage reading corrected to the pump centerline and the velocity head at the point of attachment of the suction gage). As it is easy to get the plus and minus signs of the various elements reversed, and as there are numerous precautions to be considered in taking gage readings, it is advantageous in any test to follow the instructions in the Test Code of the Hydraulic Institute.

Figure 13 illustrates the heads involved in the calculations of suction head, discharge head, total head and net positive suction head (NPSH).

Head Terms Used for Vertical Pumps

Vertical wet pit pumps may be of the volute type or of the turbine type, the latter covering the propeller type and the vertical turbine pumps, formerly called deepwell pumps. The special problems, both of a hydraulic and mechanical nature, encountered in the vertical turbine pump field have resulted in this type being considered in practically a separate field independent of the regular centrifugal pump field with different practices and terminology.

Both the wet pit pumps of the volute type and those of the propeller type have been handled primarily by engineers in the regular centrifugal pump field. With these two types total head is the discharge head measured at the centerline of the discharge nozzle, with velocity head included, plus the static distance to the suction water level. Thus the loss in the suction bell and those of the suction strainer and suction piping, if either is furnished, as well as the losses in the column pipe and elbow in the propeller type pumps are discharged to the pump.

In vertical turbine pump practice, the following head terminology is used by the National Association of Vertical Turbine Pump Manufacturers.

Laboratory Head—discharge pressure by gage measured in feet plus static vertical distance to suction water level in a test setup using the minimum length of column and shafting for a laboratory test.

Total Head—discharge pressure by gage in feet plus distance to suction water level. (In case of a closed suction, the total head is discharge pressure plus distance to centerline of suction gage minus suction pressure, all being in feet.)

Dynamic Laboratory Head—laboratory head, as defined above, plus the velocity head at the point of the discharge gage attachment.

Total Dynamic Head—total head, as defined above, plus velocity head at the point of the discharge gage attachment and, in case of a closed suction, minus the velocity head at the point of the suction gage attachment. (What was formerly called "Field Pumping Head" in the vertical turbine pump terminology is now called "Total Head.")

It is regrettable that there is a difference in terminology between the two fields. In most cases of vertical turbine pumps, the velocity head is a very small portion of the head developed by the pump so its omission actually is of little importance.

Next month—Characteristic curves.

Evaluating Human Heat Stress

A rational approach to evaluating heat stress is described and proposed by H. S. Belding, professor of environmental physiology, and T. F. Hatch, professor of industrial health engineering, both of the University of Pittsburgh, in their paper, Index for Evaluating Heat Stress In Terms Of Resulting Physiological Strains, which was presented at the Annual Meeting of ASHAE. The authors summarize the evaluation as follows: (1) thermal load which is imposed on a standard man, (2) capacity of the environment to accept the load, and (3) physiological capacity to meet the demands over a period of eight hours.

The standard man represents a composite of young, fit, acclimatized men who have been subjects of physiological investigation of the effects of heat in the laboratory and in the field.

It is believed that the method described in the paper is unique in that it yields a single figure descriptive of the overall heat stress involved in an exposure.

Human Reaction to High Thermal Stress

Two subjects were exposed separately for a 25 minute period to an environment where temperature, humidity, pressure and mass velocity were controlled in a small steel cylinder which was 70 in. long by 46 in. in diameter.

In his paper Body Evaporation During Short Exposures To Various Temperatures, Humidities, Pressures and Mass Velocities, J. W. McCutchan of the department of engineering, University of California, describes fifty such experiments on two healthy young men. The experiments showed that temperature is by far the most significant of the several environmental variables.

The object of the experiments was to derive an equation for estimating the evaporative water loss from the nude human body as a function of the environmental variables.

AIR CONDITIONING, HEATING AND VENTILATING'S

Reference Section

Design Data for Service Hot Water

FRED. M. REITER

Fuel Engineer, The Dayton Power and Light Company, Dayton, Ohio

Time-saving graphs and concise tables of data will help the engineer to design suitable service hot water systems. This is the last of a series of three Reference Sections on service hot water for multi-story commercial and industrial buildings.

AIR CONDITIONING, HEATING AND VENTILATING — APRIL, 1956

Design Data for Service Hot Water

FRED. M. REITER

Fuel Engineer, The Dayton Power and Light Company, Dayton, Ohio

This is the last of a series of three Reference Sections to help the engineer design service hot water systems for commercial and industrial use and, in general, to supply hot water in large quantities. Covered in this section are such topics as economics of hot water utilization, wastes in hot water systems, proper system installation, piping problems and combustion characteristics of fuels used with such systems. Included are a number of graphs for the design engineer and 22 useful tables for reference.

HOT water is a material upon which work has been done. Originally the water came from a well or reservoir and was pumped through pipe in streets to a building. Entering the building, the cold water passed through a water meter. At this point the user pays for all the work done on the water, the investment in pumps, piping and effort put forth to get that water to the building, under sufficient pressure and assured volume to meet all demands. In fact, the price of this water is based upon an hourly or daily demand, either as actually metered or upon the size of water meter installed to measure this rate of flow.

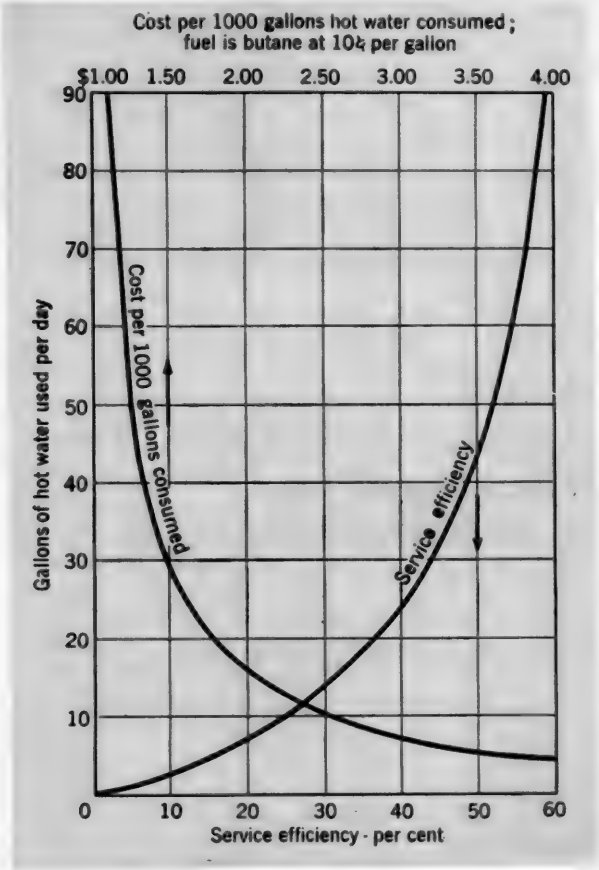


Fig. 1. Performance of a 30 gal water heater under different daily consumption rates. Source: E. A. Clifford, L-P Gas, November, 1950.

Commercial and industrial users of all utilities, water, gas, steam and electricity, find that their rates increase with the unit demand and that their monthly costs decrease as this demand is used continuously throughout the 24-hour day. It is most economical to keep the demand or use in any single hour as low as practicable, staggering heavy loads by large consumers rather than letting them pyramid their hourly consumptions in abnormal peaks. Spreading out this consumption throughout the day saves sufficient in costs to warrant the installation of roof tanks on commercial buildings, standpipes or elevated water tanks, or reservoirs for large institutions.

These same principles apply to hot water. More work must be done on the cold water to raise its temperature. Energy is consumed in heating, whether this heat is supplied by fuels like coal, oil or gas; or by secondary media such as steam or electricity. The same rules of the economical use of demand apply to hot water, in order to save in the investment for large-demand equipment and in the expenditure of unnecessary amounts of fuel to meet sudden heavy demands with long periods of heat losses between loads. For the same reasons, storage tanks are used for accumulating hot water for peak loads and for permitting longer utilization of smaller heating equipment.

Figure 1 evaluates the effect of the use of the demand rate or hourly capacity of a 30 gal liquefied gas (butane) water heater. The term "30 gal" refers to the ability of the heater and burner to produce 30 gal of hot water of about 140 deg F, or a rise of about 80 deg every hour of operation. The name plate rating stamped on most water heaters gives the Btu heat input per hour or the normal output of hot water per hour with a given temperature rise and the storage capacity of the tank.

The term "service efficiency" represents the economic utilization of the heat consumed by the heater over a period of fuel billing, such as a month. It can be interpreted for a relatively large consumption of hot water for a period of about a month, such as per 1000 gal of water. This period is long enough to take into consideration a great many cycles of on and off periods of the burners and the fixtures or faucets of the building. In this way, heat losses from the piping, heater tank, pilot fuel burning, cooling of the water heater because of draft, effects of cold air flowing upward over the hot water tank, and other wastes involved in the system are covered. It can be referred to as the "service thermal efficiency" be-

TABLE 1—BTU REQUIRED TO RAISE TEMPERATURE OF ONE GALLON OF WATER

Temperature Rise, Deg F	Thermal Efficiency of Heater, Per Cent					
	50	60	70	80	90*	100*
40	666	555	477	417	370	333
60	1,000	833	715	629	556	500
80	1,332	1,111	953	833	740	666
100	1,667	1,388	1,191	1,045	926	833
120	2,000	1,667	1,429	1,250	1,111	1,000
140	2,333	1,944	1,668	1,462	1,296	1,166

*These efficiencies are hypothetical; 100% efficiency would be equivalent to input rating.

cause of these heat losses, as contrasted to the thermal efficiency of the heater or hot water boiler during an operating period. The service efficiency would include losses due to leaks in the water system or any conditions inherent to the system.

The service efficiency curve of Fig. 1 rises rapidly with the increased use of water for the 24 hours of the day. The use of 30 gal of hot water per day would presume one hour of operation at heater capacity in 24 hours. From the data given in previous articles*, an average dwelling unit for a family should use its demand capacity four hours per day. As the use of the demand capacity drops, the cost goes up rapidly, as shown by the left curve on the top line-up of costs per 1000 gallons of hot water consumed. For 90 gal per day, the cost of operating the 30 gal heater runs about $1.10 per 1000 gal. For a normal family use of 50 gal per day, this cost becomes about $1.25 per 1000 gal which is the cost for almost a month's usage. But for the low usage of 10 gal per day, the cost jumps to over $2.50 per 1000 gal. This illustrates the principle of the use of demand and service efficiency.

In order to quickly derive the hourly demand rate of the water heaters in terms of gallons per hour, Fig. 2 serves to convert the Btu per hour input into gallons per hour output capacity, for several normal temperature rises, for an average thermal efficiency of 70%. Conversion to other conditions or efficiencies can be made readily from Table 1.

When two types of fuels are compared so that one may

*Reiter, F. M., Service Hot Water Design for Multi-story Buildings, Air Conditioning, Heating and Ventilating, Dec. 1955. Reiter, F. M., Service Hot Water for Commercial and Industrial Use, Air Conditioning, Heating and Ventilating, Feb. 1956.

TABLE 2—NORMAL CHARACTERISTICS OF FUELS AS FIRED IN AVERAGE COMMERCIAL AND INDUSTRIAL WATER HEATERS

Type of Fuel	Btu Content	Per Unit	Average Efficiency of Equipment, Per Cent	
			Thermal	Service (Over-all System)
Natural gas	1050	cu ft	80	60
Manufactured gas	530	cu ft	80	60
Mixed gas	850	cu ft	80	60
Propane gas	91,500	gallon	80	60
Butane gas	102,600	gallon	80	60
Fuel oil, No. 4	140,000	gallon	70	52.5
Central station steam	1000	pound	90	67.5
Coal	25 million	ton	60	45
Electricity	3,412	KWH	100	75

Source: A. O. Smith Corp.

TABLE 3—EQUIVALENT QUANTITIES OF FUELS REQUIRED TO SUPPLY THE WATER HEATED BY ONE TON OF COAL*

Fuel	Service Efficiency, %	Ratio to 1 Ton of Coal, in Own Units		
		Full Heat Content: 100% Efficiency	With Listed Service Efficiency	Final Ratio to 1 ton of Coal
Coal	45	1 ton	2.2 tons	1 ton
Fuel oil, No. 4	52.5	265 gal	505 gal	230 gal
Natural gas	60	23,400 cu ft	39,000 cu ft	17,730 cu ft
Propane gas	60	297 gal	495 gal	225 gal
Electricity	75	7,913 kwh	10,550 kwh	4,795 kwh

*Comparison made with one ton of coal rated at 13,500 Btu per lb.

determine the equivalent quantity of fuel to replace another fuel, the following formula* is used:

$$X = \frac{M \times H_m \times E_m}{H_x \times E_x}$$

Where X = required equivalent
M = quantity of known fuel
H_m = heating value of known fuel
E_m = operating efficiency of known fuel
H_x = heating value of required equivalent
E_x = operating efficiency of required equivalent

Table 2 lists the heat characteristics of fuels as fired in average commercial and industrial water heaters.

Table 3 compares four sources of heat and the ratio to one ton of coal of 13,500 Btu per pound.

The economics of keeping the temperature of the hot water as low as practicable, in order to do the required job, is important. Figure 3 illustrates how the costs of maintaining hot water at various temperatures vary.

*For a graphical solution to fuel equivalent problems, based on this formula, see data sheet, Heating and Ventilating, Feb. 1945; Heating and Ventilating's Engineering Databook (The Industrial Press) page 2-40.

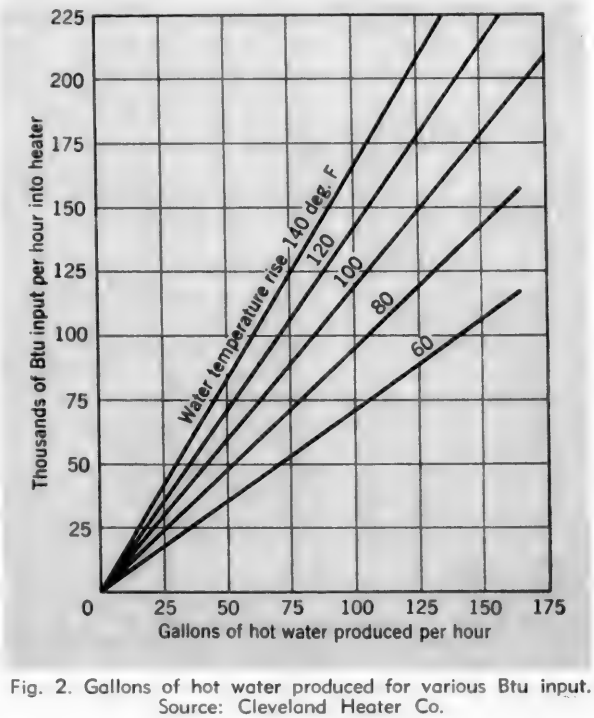


Fig. 2. Gallons of hot water produced for various Btu input. Source: Cleveland Heater Co.

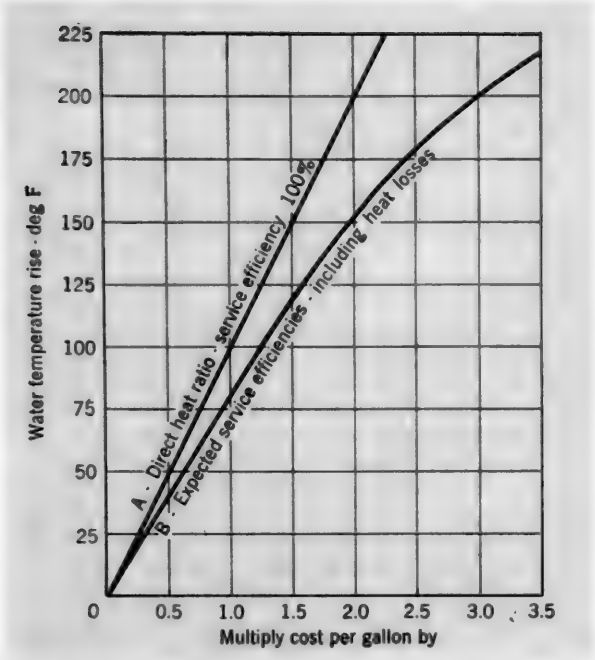


Fig. 3. Factors for heating water raised to various temperatures compared to a standard in which a 100-deg rise equals 1.0.

Curve *A* is the calculated increase in the heat requirements in direct ratio to the temperature rise, with a service efficiency of 100%. Curve *B* represents the expected values showing an accelerated increase in the cost as the hot water temperature rises. This acceleration is because of the diminished use of the capacity of the system, longer off periods in which heat losses continue, and greater temperature gradient or difference between the ambient temperature and all of the hot water lines, storage tanks, hot water using equipment—all of which lose more heat at higher temperatures. The actual incremental increase will depend greatly upon factors of usage, capacity, size of piping and equipment and insulation. Costs are augmented as the temperatures rise.

The saving expected on the theory that less very hot water will be used when mixed with cold water in order to provide comfortable water temperatures for commercial, industrial or even personal needs, will not materialize. There is a tendency to use hotter water, with a consumption that will actually exceed in practice, the calculated mixture component of hot water.

The combustion stack heat losses are greater when the hot water is heated to high temperatures. The heat transfer from the hot fuel flue gases to the cold water is greater than that to very hot water. A higher thermostat setting of 100 deg in the hot water temperature will increase flue gas losses considerably, increasing fuel costs proportionately.

Corroboration of these estimates is supplied in Table 4, which compares the results that would be obtained from setting the hot water thermostats of a dwelling unit hot water heat at three temperatures, 125, 140 and 155 deg. The gas consumption per gallon increases and the system efficiency decreases with the increase in water temperature setting. Data show the unit savings with increased load factor, in the gas consumption per gallon, regardless of the hot water temperature maintained.

TABLE 4—MONTHLY WATER AND GAS CONSUMPTION FOR WATER MAINTAINED BY THERMOSTATIC CONTROL. COLD WATER TEMP. 50 DEG F

Gallons of Hot Water Used per Month	Thermostat Setting, Temp Deg F		
	125	140	155
	Water Temp Rise, Deg F		
	75	90	105
	Cu Ft 1000 Btu Gas Consumed per Gallon Hot Water Used		
400	1.25	1.60	2.15
800	1.05	1.40	1.80
1200	0.99	1.29	1.55
1600	0.93	1.20	1.33
2000	0.88	1.10	1.18
3000	0.81	1.00	1.05
4000	0.78	0.90	0.98

Figures based on data of John Wood Mfg. Co. Water used at normal rate of 50 gal of 140 deg water per person per day; water heater efficiency, 70%.

On the basis of these data, Table 5 gives the comparative cost of producing 1000 gallons of hot water, based upon a water temperature rise of 100 deg. Columns *A* to *J* list these fuels and the price of each that will give the hot water shown in Column *K*. For temperature rises other than 100 deg, multiply these costs by the factors of Curve *A*, Fig. 3. For other temperatures plus their service efficiencies (not 100%), multiply by the factors of Curve *B*, Fig. 3.

Quite often it is desirable to know how many gallons of hot water can be bought for a fixed sum of money. This is of particular interest in areas where different fuel gases are under consideration. Propane, butane and other liquefied gases may be used, or natural gas, mixed or manufactured utility gases. Figure 4 is designed to assist in determining these costs for different fuels, in terms of the number of gallons of water heated 60 deg that can be purchased for one cent. In order to compare these fuels, all were converted to their gaseous state, so that

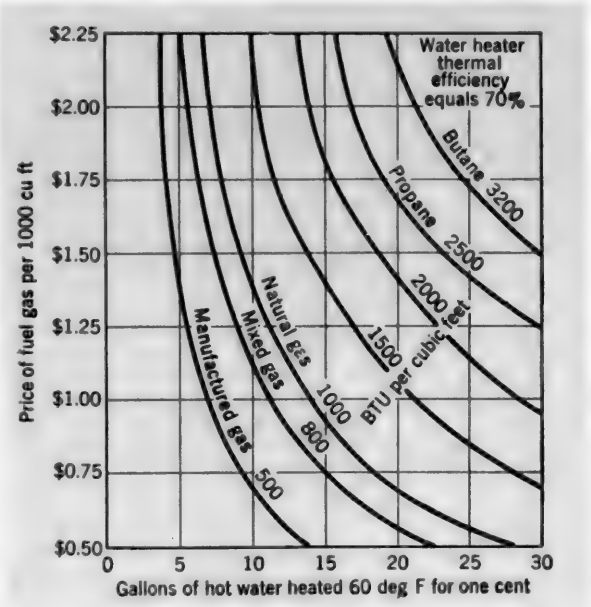


Fig. 4. Gallons of hot water heated 60 deg that can be purchased for one cent. Source: Cleveland Heater Co.

TABLE 5—COMPARATIVE FUEL COST CHART FOR COMMERCIAL WATER HEATING

To determine the cost of heating 1000 gallons of water, raised 100 deg, for any type of fuel at various cost levels, locate the cost per billing unit of the fuel in the proper column, A to J. Then follow the line to the right and read in column K[1] the cost of heating 1000 gallons of water.

FUEL OR ENERGY SOURCE AND COST (IN DOLLARS) PER UNIT									K
A Natural Gas, 1000 Cu Ft	B Mfd Gas, 1000 Cu Ft	C Mixed Gas, 1000 Cu Ft	D Propane Gas[2], Gallon	E Butane Gas[3], Gallon	F Fuel Oil, Gallon	G Steam, 1000 Lb	H Coal, In Boiler, Ton	J Electric Power, Kw-Hr	Cost per 1000 Gal Hot Water Raised 100 Deg, Dollars
0.40	0.20	0.32	0.035	0.039	0.047	0.43	7.14	—	0.53
.43	.22	.35	.037	.042	.051	.46	7.68	—	.57
.45	.23	.36	.039	.044	.053	.48	8.03	—	.59
.48	.24	.39	.042	.047	.057	.52	8.57	—	.63
.50	.25	.41	.044	.049	.059	.54	8.92	—	.66
.52	.26	.42	.045	.051	.061	.56	9.27	—	.69
.54	.27	.44	.047	.053	.064	.58	9.64	—	.71
.56	.28	.45	.049	.055	.066	.60	10.00	—	.74
.58	.29	.47	.05	.057	.068	.62	10.35	—	.77
.60	.30	.49	.052	.059	.071	.64	10.70	—	.79
.62	.31	.50	.054	.06	.073	.67	11.05	.0025	.82
.64	.32	.52	.056	.062	.075	.69	11.42	—	.85
.66	.33	.53	.057	.064	.078	.71	11.76	—	.87
.68	.34	.55	.059	.066	.08	.73	12.12	—	.90
.70	.35	.57	.061	.068	.083	.75	12.49	—	.92
.72	.36	.58	.063	.07	.085	.77	12.84	—	.95
.74	.37	.60	.064	.072	.087	.79	13.20	.0030	.98
.76	.38	.61	.066	.074	.089	.81	13.51	—	1.00
.78	.39	.63	.068	.076	.092	.84	13.91	—	1.03
.80	.40	.65	.07	.078	.094	.86	14.27	—	1.06
.82	.41	.66	.071	.08	.097	.88	14.62	—	1.08
.84	.42	.68	.073	.082	.099	.90	14.97	—	1.11
.86	.43	.70	.075	.084	.101	.92	15.34	.0035	1.14
.88	.44	.71	.077	.086	.104	.94	15.70	—	1.16
.90	.45	.73	.078	.088	.106	.97	16.05	—	1.19
.92	.46	.75	.08	.09	.108	.99	16.41	—	1.21
.94	.47	.76	.082	.092	.111	1.01	16.76	—	1.24
.96	.48	.78	.084	.094	.113	1.03	17.12	—	1.27
.98	.49	.79	.085	.096	.116	1.05	17.49	.0040	1.30
1.00	.50	.81	.087	.098	.118	1.07	17.84	—	1.32
1.05	.53	.85	.091	.102	.125	1.12	18.78	—	1.39
1.10	.55	.89	.095	.107	.128	1.17	19.60	.0045	1.45
1.15	.58	.93	.099	.112	.135	1.22	20.54	—	1.52
1.20	.60	.97	.104	.114	.139	1.28	21.35	—	1.58
1.25	.63	1.01	.109	.121	.144	1.33	22.29	.0050	1.65
1.30	.66	1.05	.113	.127	.151	1.39	23.24	—	1.72
1.35	.68	1.09	.118	.131	.156	1.44	24.05	.0055	1.78
1.40	.71	1.13	.122	.136	.163	1.49	25.00	—	1.85
1.45	.73	1.17	.126	.14	.168	1.54	—	—	1.91
1.50	.76	1.21	.131	.144	.174	1.60	—	—	1.98
1.55	.78	1.25	.135	.15	.182	1.66	—	—	2.05
1.60	.81	1.29	.139	.156	.189	1.71	—	.0065	2.11
1.65	.83	1.33	.143	.160	.195	1.76	—	—	2.18
1.70	.86	1.37	.148	.165	.20	1.82	—	—	2.24
1.75	.88	1.41	.152	.171	.206	1.87	—	.0070	2.31
1.80	.91	1.45	.156	.176	.21	1.92	—	—	2.38
1.85	.93	1.49	.16	.181	—	1.96	—	.0075	2.44
1.90	.96	1.53	.165	.185	—	2.03	—	—	2.51
1.95	.98	1.57	.17	.19	—	2.08	—	—	2.57
2.00	1.01	1.61	.174	.195	—	2.14	—	.0080	2.64
2.05	1.03	1.64	.175	.20	—	2.19	—	—	2.71
2.10	1.06	1.69	.18	.205	—	2.24	—	.0085	2.77
2.15	1.09	1.73	.185	.209	—	2.30	—	—	2.84
2.20	1.11	1.77	.191	.214	—	2.35	—	.0090	2.90
2.47	1.24	2.00	.216	.24	—	—	—	.0100	3.26
3.08	1.55	2.49	.268	.30	—	—	—	.0125	4.07
3.70	1.86	2.98	.32	.36	—	—	—	.0150	4.08
4.32	2.17	3.49	.375	.42	—	—	—	.0175	5.70
4.93	2.48	3.98	.428	.48	—	—	—	.0200	6.51
5.54	2.80	4.48	.48	.54	—	—	—	.0225	7.32
6.16	3.10	4.98	.536	.60	—	—	—	.0250	8.14

[1]The figures in column K show the cost for heating 1000 gals of water, raised 100 deg, based on the price of the standard billing unit for each type of fuel shown on the same line in columns A to J, inclusive. (At 100% efficiency, 833 Btu are required to raise one gallon of water, 100 deg F) All costs for heating water shown in column K are based on the thermal efficiency indicated in Table 2 for heaters using each type of fuel and also allow for radiation and stand-by heat losses by discounting the thermal efficiency by 25%.

[2]Where propane gas is purchased by the pound, the equivalent price per pound may be determined by multiplying the gallon price in column D by 0.235.

[3]Where butane gas is purchased by the pound, the equivalent price per pound may be determined by multiplying the gallon price in column E by 0.207.

TABLE 6—HEAT VALUES FOR VARIOUS KINDS OF GAS

Fuel	Approximate Btu per Cu Ft of Gas
Manufactured gas	500
Mixed gases	800
Natural gas *A*	1,000
Natural gas *B*	1,100
Propane gas	2,500
Butane gas	3,200

they fit on the same curve coordinates. These fuels are gasified in proper types of carburetor equipment before burning, so they travel to the burners and burn as true gases. They have the heat values given in Table 6.

Two intermediate curves of 1,500 and 2,000 Btu per cu ft were added in Fig. 4 for possible gas mixtures that may result in these heat values. These data supply basic costs in units that can be supplied readily to any computations.

WASTES IN HOT WATER SYSTEMS

Definite data are presented on some of the more common wastes encountered in commercial and industrial hot water systems.

Improper Sizing of Hot Water Heaters

It is most difficult to figure precisely all of the factors involved in laying out hot water systems. Operating conditions of the building or factory may change from the original plans for which the hot water system was designed. Apartments may become unoccupied; more meals served in restaurants than planned; laundry service may increase; and other changes take place that alter operating performance. Fuel bills may be high because of excess or insufficient hot water generating capacity or recovery capacity.

Table 7 lists tests run on hot water heaters of three different sizes, set to deliver varying amounts of hot water per day. At low daily usage, the rate of heat input or recovery capacity became too great due to low thermal

TABLE 7—RELATION BETWEEN HOT WATER CONSUMPTION AND OVERALL THERMAL SERVICE EFFICIENCY FOR MONTHLY OPERATION AT DIFFERENT DELIVERIES PER DAY

Hot Water Delivered per Day Under Test Conditions, Gallons	Estimated Gross Monthly Consumption, Gallons	Estimated Hourly Usage Based upon 4-hour Use of Demand per Day Average, Gallons	Size of Hot Water Heater: Gallons per Hour Delivery Capacity		
			20	30	40
			Btu Input Into These Heaters During Tests		
			2,500	4,500	20,000
			Monthly Service Thermal Efficiency, Per Cent		
25	600	6	27	25	24
30	750	7.5	38	35	32
40	1,000	10	45	42	39
50	1,250	12.5	52	49	44
60	1,500	15	57	54	47
70	1,750	17.5	59	56	50
80	2,000	20	60	57	52

Hours of usage: 4 hours, based upon data of A. M. Apman for apartments and private homes. Gross monthly consumption based upon 25 days usage, per average month, to fit commercial and industrial practices.

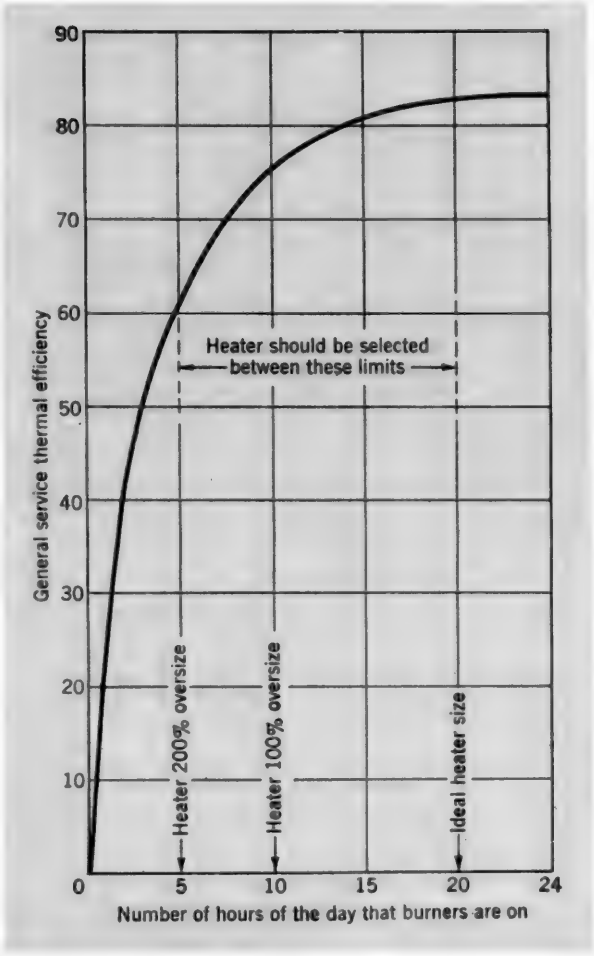


Fig. 5. Relation of service thermal efficiency to number of hours per day that burners are on.

efficiency. As the consumption rose to a greater use of the capacity of the heater, the overall system efficiency increased. At the design capacity, the highest overall efficiency was 60% for gas heaters, as indicated in Table 2. Increasing hot water flow beyond the input heat capacity of the burners would decrease the temperature rise of the water and probably increase the thermal efficiency of the heater because of greater absorption of heat by the cooler water. However, the user might complain because of the diminished hot water temperature.

Data on tests run on various types of water heaters, Table 8, compares monthly gas consumption under two conditions; (1) operating for an average family dwelling unit consuming 50 gal with normal withdrawal, and (2) on standby operation with no withdrawal of hot water. Under the latter conditions, the losses in the system show up. The monthly gas consumption serves as a measure of the relative monthly service thermal efficiencies and monthly costs of the different types of heaters and operations. These data are not to be applied precisely to any particular job, but rather to serve as a guide.

The American Gas Association has sponsored many tests and surveys for basic information aimed for the proper sizing and installation of hot water heaters. Results of studies made by N. T. Sellman, Service Engineer, AGA are summarized in Fig. 5. This curve serves to relate

the general service thermal efficiency with the number of hours of the day that the burners or heat input capacity are on.

Hot Water Waste and Losses

One of the surest ways to keep hot water service costs down is to keep the waste of hot water to a very minimum. Apartment, hotel and factory owners understand this and constantly caution their maintenance personnel to stop leaks in hot water lines, fittings and fixtures as quickly as possible. Hot water is an expensive fluid. Small leaks may seem hardly to be worth much effort, especially if a small drip of a few drops per second occurs. However, the cumulative effect of these drips may total considerable water and fuel expenditure if allowed to continue, day after day.

Table 9 portrays the monthly loss of hot water and fuel gas that can be expected from leaky faucets with various rates of flow. When one considers the large number of faucets and fixtures found in large establishments and institutions, this tabulated loss can be multiplied many fold.

TABLE 8—COMPARISON OF VARIOUS TYPES OF HOT WATER HEATERS

Units operating with manufactured gas of 535 Btu per cu ft under average dwelling unit conditions of 50 gal hot water per day withdrawal, and as standby with no withdrawal.

No. of Test	Type of Heater	Rate of Heat Input Btu per Hour	Storage Capacity of System, Gallons	Gas Consumption per month	
				50 gal Withdrawal per Day	Standby no Withdrawal
1	Multi-flue, slow recovery	5,500	45	3,460	760
2	Reversible flue, slow recovery	4,500	28	3,670	1,200
3	Instantaneous, 2.5 gpm	120,000	28	3,670	400
4	Internal single flue, adjustable recovery	9,000	30	3,790	1,100
5	Same as No. 4, adjusted to low heat input	2,500	30	3,800	1,000
6	Reversible flue, slow recovery	5,500	45	3,830	1,300
7	Instantaneous, 3 gpm	125,000	45	3,840	300
8	Underfired, quick recovery type, set at ½ heat input rating	10,700	20	3,910	1,050
9	Multi-flue, quick recovery	25,000	22	4,190	1,600
10	Single internal flue, quick recovery	25,000	38	4,330	1,400
11	Conversion burner, slow recovery	4,200	30	4,390	1,700
12	Same as No. 8, standard rating	20,000	20	4,570	1,300
13	Conversion, slow recovery	3,200	30	4,970	2,200
14	Side arm coil, quick recovery	30,000	32	4,970	1,800
15	Side arm coil, quick recovery	21,000	32	5,370	1,900
16	Same as No. 11 but tank uninsulated	4,200	30	5,960	2,300

TABLE 9—MONTHLY LOSS OF HOT WATER AND GAS RESULTING FROM LEAKY FAUCETS

No. of drops Counted per Minute from Faucet	Gallons Hot Water Lost per Month	Cu Ft 1000 Btu Gas Loss per Month Due to Hot Water Lost in Leak*
60	192	230
90	310	370
120	429	520
150	525	630
3 in.**	1,095	1,314
4 in.**	2,190	2,630

Source: Industrial Gas, January 1955, p. 9.
*Hot water heated 100 deg F with 70% water heater efficiency.
**Length of water tail from leaky faucet just before breaking into drops.

It has been mentioned previously that automatic machinery using hot water can waste a great deal of water without the operator realizing that it goes down the drain. Valve settings must be constantly checked, instruments and controls kept in proper operating order, inspection made with (1) thermometers or water meters, (2) by examination of the materials or products handled, and (3) by every means available in order to save hot water and heat. Abnormal bills for the gas or fuel should evoke suspicion of waste. In larger establishments using considerable hot water, it may be economical to purchase a water meter and to install it in the cold water inlet to the hot water heater system. Abnormal use can then be noted by daily, weekly or monthly readings. Standard consumptions per unit of material or personnel can be established, and variations checked for waste. It is important to set up periodic routine inspections for preventative maintenance.

Proper Installation

There are some important fundamentals that must be observed in order to get the best and most economical hot water service. There are many sick installations that could have been avoided by care with some of the details.

Fuel-fired heaters must be flue-connected, through a good draft check or diverter, as close to a good clear chimney as practicable. Flues carrying combustion gases should not be long nor have sharp bends.

Piping to the hot water system should be direct and pitched upward to give free flow and as much natural

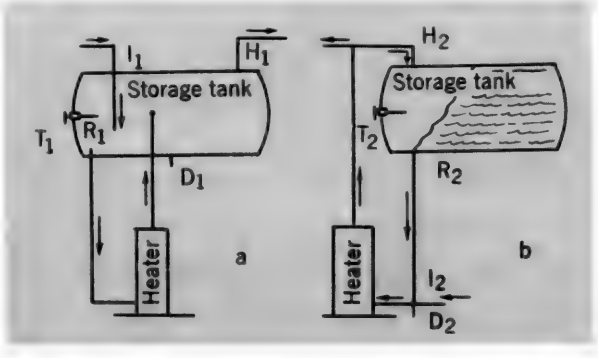


Fig. 6. Proper (a) and Improper (b) methods of connecting hot water heater to a storage tank in a large commercial or industrial system.

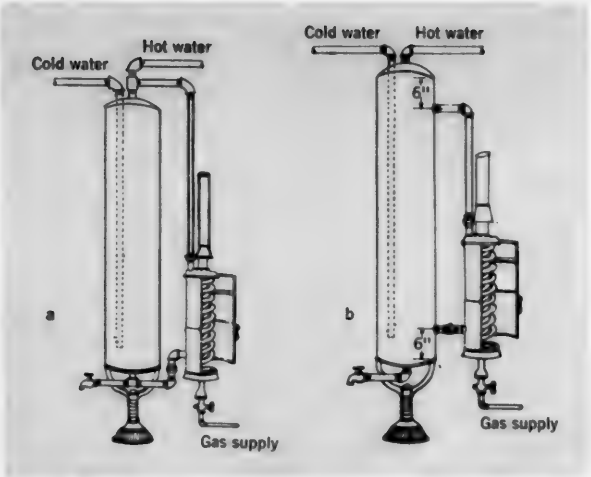


Fig. 7. Proper (a) and Improper (b) methods of connecting hot water heater to storage tank for small facilities, using a side arm coil heater.

circulation as can be obtained, if no circulating lines are installed. Extra circulating lines should be avoided, wherever possible. In the average building under four floors in height, this should not be necessary.

Connections of cold and hot storage tank circulating lines should be carefully correlated so that maximum natural circulation occurs. No dead pockets of cold water should be permitted to collect and remain trapped. If the full storage tank capacity is not within the circulation system, the "unused portion" should not have been purchased and installed. Figure 6 illustrates a right and wrong storage tank circulating arrangement. In this illustration, R_2, connected flush with the bottom, will collect sediment and plug up the heater. The outlet D_2, may only drain clean cold water out of the inlet line I_2. The heater should only heat the water of the storage tank with no heater connections directly to or from the building cold or hot water lines. Such connections should be part of the storage system.

In the correct arrangement, *a*. the heater hot circulating

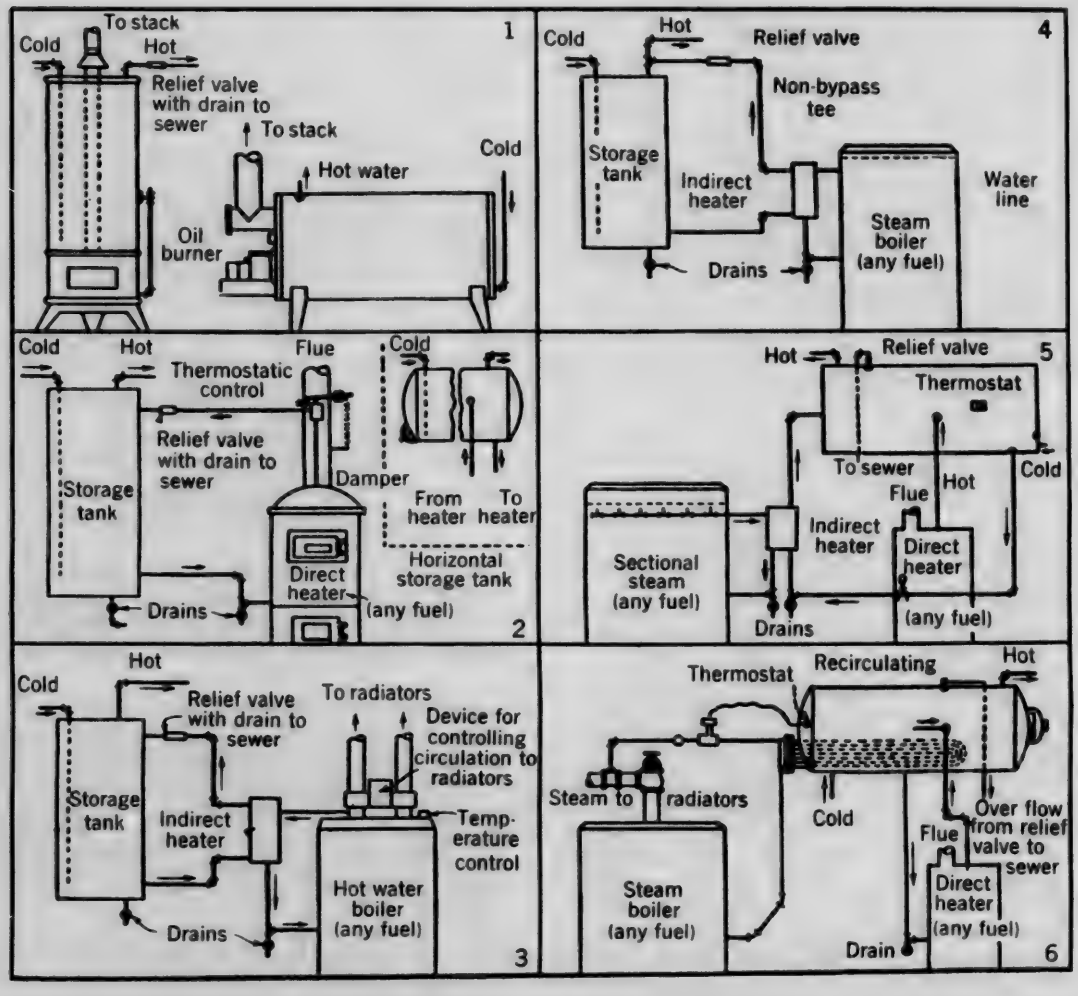


Fig. 8. Hot water storage piping systems for buildings having moderate hot water demands. (1) Two types of units. Each is fired separately and has a direct heater and tank combined. (2) Fired separately, direct heater with a separate tank. (3) Fired from a hot water heating plant, external indirect heater. (4) Fired from a steam heating plant, external indirect heater. (5) Combination of Types 2 and 4. (6) Combination of Type 2 with steam boiler having been submerged in tank.

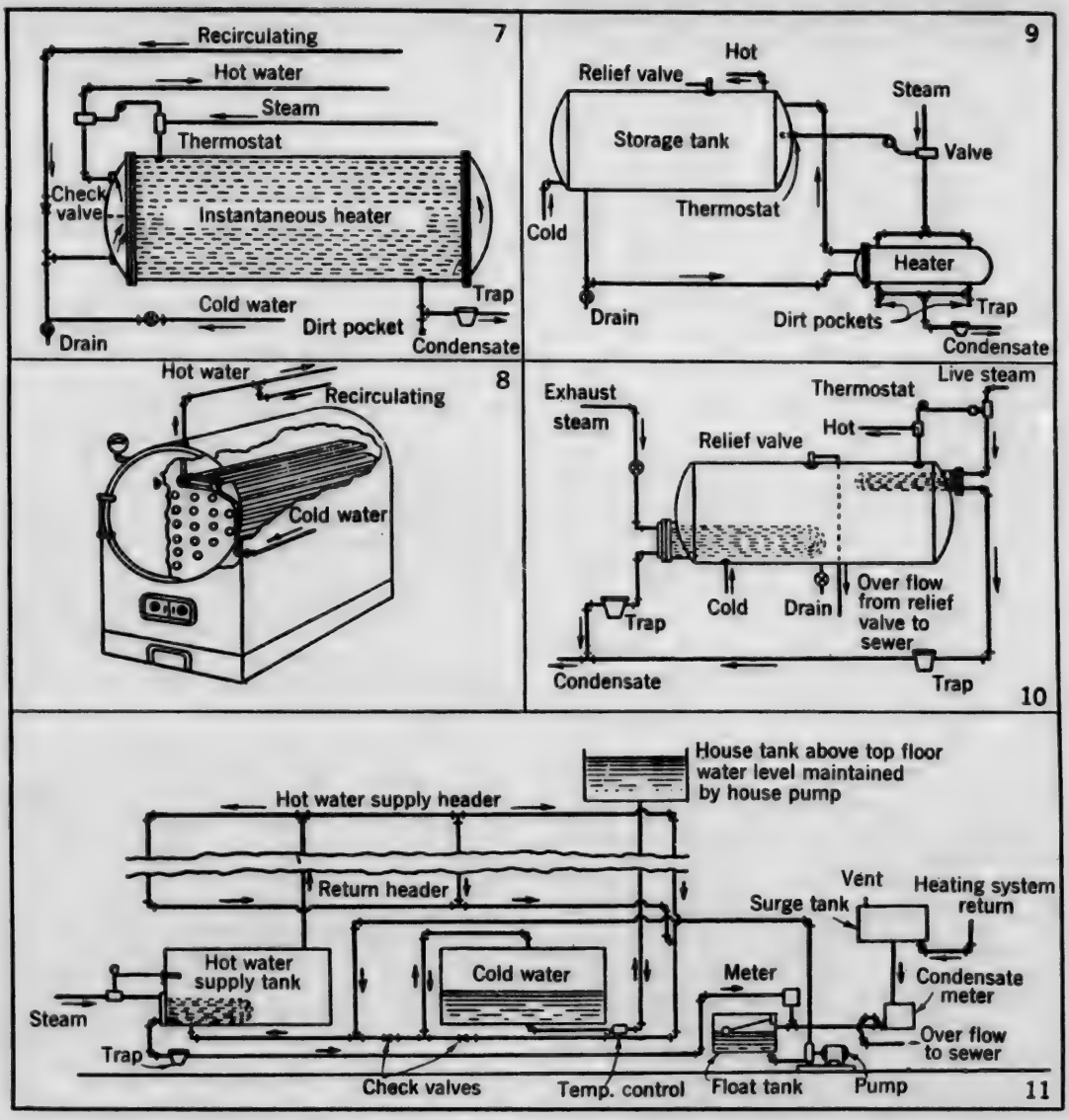


Fig. 9. Hot water supply systems for buildings having medium or large hot water demands. (7) Instantaneous heater supplied with steam, no storage tank. (8) Heater submerged in boiler water, instantaneous water heater, no tank. (9) System heated by steam, indirect heater, storage tank. (10) System heated by steam, tempering tank with submerged live and exhaust steam coils. (11) Steam condensate used for hot water, auxiliary steam coil, tank.

water enters between the tank hot water outlet to the building in the upper right end and the return circulating line at the lower left. The cold water, I_1, enters the storage tank, not the heater, not far from the thermostat, T_1. Only storage water, H_1 can leave the heater system. Maximum turnover of the water in the storage tank is assured. The return line to the heater, R_1, is properly placed.

Figure 7 points out the same faults in a smaller assembly that uses a side arm coil heater. The principles are the same regardless of size or purpose of the installation. There is no need to illustrate the package assemblies, such as the automatic storage water heater because these have been approved as a complete assembly by the American Gas Association and/or approval laboratories that are accepted by municipal, state and national code authorities. Figures 8 and 9 give complete piping diagrams and connections for a number of storage and hot water supply systems of various types. These show many forms of heat sources: Water and steam from boilers and heat exchangers, in direct and multiple connections.

PIPING PROBLEMS IN HOT WATER SYSTEMS

The importance of proper piping in hot water systems cannot be overemphasized. Piping has been mentioned in previous sections in connection with other phases of hot water problems. Hot water piping should be kept as small in size as will deliver maximum needs within the limits of the pressure drop that will give ample capacity for all faucets, fixtures and equipment. Making the piping small in diameter has the same effect as moving the heater

TABLE 10—RELATIVE LENGTHS OF COMMON SIZE PIPE USED IN HOT WATER SYSTEMS GIVING THEIR EQUIVALENT CAPACITIES OF HOT WATER

Nominal Size of Pipe, Inches I.D.	Relative Lengths of Pipe of the Normal Sizes Listed That Give the Same Volume for Other Sizes in Content of Water					
	1½	1¼	1	¾	½	⅜
1½	1.00	0.73	0.42	0.26	—	—
1¼	1.36	1.00	0.57	0.35	0.20	—
1	2.37	1.74	1.00	0.62	0.35	0.22
¾	—	2.82	1.62	1.00	0.57	0.35
½	—	—	2.84	1.75	1.00	0.63
⅜	—	—	—	2.77	1.58	1.00
Lineal ft per gal	9.4	12.8	22.3	36.1	63.2	100.8

Source: Data of G. C. Carnahan, Peoples Gas Light & Coke Co., Chicago, Ill.

closer to the using appliance. Table 10 is a condensed tabulation giving the relative lengths of the common sizes of pipe used in hot water systems insofar as their volume or contents are concerned. These figures would be used for heat losses and the need for circulating piping.

The flow of water moving through piping is affected by the friction encountered. Table 11 gives the relative flow capacities for various sizes of pipe, as a function of internal area, for a fixed length of 100 ft of pipe. The flow of water through a pipe varies as the square root of the diameter while the volume follows the square of the diameters. The flow diminishes with pipe length, while volume increases in proportion to the length.

For example, if a design is changed from ½ to 1 in. pipe, then moving along the horizontal line for ½ in. pipe in Table 11, to the 1 in. vertical column, one finds that for equal lengths of pipe, a 1 in. pipe has 5.36 times the flow of a ½ in. pipe.

If it is found that a 1¼ in. ID hot water pipe supplies too much water and a flow 0.1 of the original flow was desired, then in the same table move along the horizontal line for 1¼ ID and find that ½ in. pipe gives a relative flow of 0.11, which is close enough for the problem.

Tables 12, 13, 14 and 15 are added to supply the conversion factors for the interchange of units of volume, weight, pressure, power and other data useful in these computations. More detailed information can be obtained from standard handbooks that contain flow data.

TABLE 11—RELATIVE FLOW CAPACITIES FOR COMMON SIZES OF PIPE USED FOR HOT WATER

Based on 100 ft standard lengths, 60 psig inlet pressure, no back pressure.

Nominal Size of Pipe, Inches, ID	Nominal Size of Pipe, Inches, ID					
	1½	1¼	1	¾	½	⅜
	Internal Area, Sq In					
	1.767	1.227	0.785	0.442	0.196	0.110
	Water Flow, 100 Ft Length, 60 psig					
	100	64	40	20	7	4.5
1½	1.00	0.64	0.40	0.20	0.07	0.45
1¼	1.56	1.00	0.63	0.31	0.11	0.07
1	2.56	1.60	1.00	0.50	0.18	0.11
¾	—	3.20	2.00	1.00	0.36	0.22
½	—	—	5.36	2.88	1.00	0.66
⅜	—	—	—	4.43	1.55	1.00

Source: Based upon data from Rent, Flow of Water in House Service Piping, by Thomas Meter Co.

TABLE 12—MASS AND CAPACITY EQUIVALENTS FOR WATER AT 60 DEG F

Water	Equivalents			
	Cubic Feet	Cubic Inches	Gallons	Pounds
1 cubic foot	1	1728	7.4805	62.367
1 gallon	0.1227	231	1	8.338
1 pound	0.0161	27.707	0.1199	1

USE OF HOT WATER FOR SPACE HEATING

Many smaller plants utilize their hot water system or install a separate unit hot water heater for heating radiators in limited areas. Plants that utilize direct-fired air circulation unit heaters can use an isolated hot water heating system for paint storage, spray, storage rooms for solutions, chemicals, and other special purposes, where their regular means of heating cannot be utilized. The hot water can be circulated through cast iron wall or pipe radiators set high on the walls or against the ceiling in order to obtain natural water circulation. For larger jobs, circulating pumps may be used to advantage.

The heat required for the given room or area can easily be computed from the heat loss of the walls, roof and windows, or on the basis of the volume of the room, in terms of Btu heat loss per hour. The quantity of hot water that must be supplied can be computed by means of this basic equation:

$$W = \frac{H}{\text{Specific Heat } (t_h - t_c)}$$

where W = pounds of hot water to be supplied per hour

H = Btu of heat required per hour

Specific heat of hot water = 1.00

$t_h - t_c$ = temperatures of hot water entering and leaving the room, deg F

It is necessary to know how many square feet of radiating surface is actually installed and available for heating or that must be made available to do the job. Table 16, which gives the necessary water circulation, is presented to assist one to utilize hot water for space heating.

In all phases of heating with water, whether in heat exchangers, radiators or any mode of heat transfer, scale or accumulated matter in the tubes, piping, exchangers or radiators reduces the efficiency of heat transfer. Periodic inspection and cleaning is advisable, not only for the savings obtained, but as security from trouble.

COMBUSTION CHARACTERISTICS OF FUELS

Among the wastes and heat losses encountered in hot water systems, there must be included poor firing of the fuels used in hot water heaters and boilers to supply heat.

In discussing the average efficiencies of hot water

TABLE 13—PRESSURE EQUIVALENTS AT 60 DEG F

Unit	Equivalent			
	PSI	Inches Mercury	Inches Water	Atmosphere
1 lb per sq in.	1	2.042	27.707	.0680
1 inch mercury	0.490	1	13.572	.0333
1 inch water	0.036	0.0736	1	.00246
1 atmosphere	14.696	29.921	407.7	1

TABLE 14—POWER EQUIVALENTS

Unit	Equivalent			
	HP	Ft lb per Sec.	Btu per Sec.	KW
1 horsepower	1	550	.7073	.7457
1 ft lb per second	.0018	1	.0013	.0013
1 Btu per second	1.414	777.646	1	1.0543
1 kilowatt	1.341	737.560	.9484	1

heaters, it was mentioned that gas heaters averaged about 70% thermal efficiency. Tables were presented for these efficiencies for all common fuels used in heating water. Were a heat balance made of the gas-fired water heater, the balance of 30% (100-70) would be almost composed of the heat carried up the chimneys in the hot combustion flue gases. Perhaps up to 5% loss of efficiency could be charged to boiler and heater radiation of heat to the surrounding atmosphere or materials.

Losses occurring at the water boiler or heater, other than the efficient heat passed to the hot water, include:

1. Dry flue gases going up the stack.
2. Heat held in the boiler and heater metal, in the equipment or setting.
3. Loss due to moisture in the flue gases formed by burning hydrogen and by evaporating the moisture in the fuel.
4. Incomplete combustion of fuel components in gases, liquids or solids.
5. Unburnt fuel in ashes.
6. Loss by radiation and conduction.

The higher the stack temperature of the flue gases, and the lower the CO_2 thereof, the greater these stack losses will be. Table 17 gives the per cent of the total heat content of the fuel that is lost in the dry stack gases, for the fuels commonly used in commercial and industrial establishments. These losses are given for various percentages of CO_2 but for an average flue gas temperature of 400 deg.

Low CO_2 generally means excess air and high stack losses. The excess air cools the gases and reduces the heat transferred to the water. Carbon monoxide, CO, indicates insufficient air, loss of fuel and possibly a hazardous condition for poisoning the atmosphere if the CO gets into the working areas. The CO content of the flue gases of water heaters must be nil. CO above 5% is generally caused by soot deposits and restricted drafts. These conditions create furnace pressure and force the CO into the room. In the working area, CO percentages of 0.01% or more can be lethal. This is based on figures issued by the American Conference of Governmental Industrial Hygienists. Usually acrid fumes or odors accompany such poor combustion.

Since such a large percentage of water heaters are

TABLE 15—FACTORS FOR WATER

Temp., Deg F	Water Temp. Increased to 212 Deg F Expands, %	Vapor Pressure, PSI
39.2	4.343	0.1179
60	4.248	0.2725
212	——	14.697

TABLE 16—WATER CIRCULATION NECESSARY IN HOT WATER SPACE HEATING SYSTEMS FOR VARIOUS DROPS IN TEMPERATURE THROUGH THE HEATING SURFACES

Drop in Water Temp. Through Radiator, Deg F	Water Necessary, Gallons per Minute			
	Per Sq Ft of Radiator Rating			Per 1000 Btu per Hour of Heat Load** 1000 Btu per Hr
	Usual Gravity Hot Water Rating* 160 Btu per Hr	Intermediate or pumping Water Rating** 200 Btu per Hr	Rating if Steam Were Used** 240 Btu per Hr	
10	0.0329	0.0417	0.0500	0.2083
11	0.0299	0.0379	0.0454	0.1893
12	0.0274	0.0347	0.0417	0.1736
13	0.0253	0.0320	0.0385	0.1600
14	0.0235	0.0298	0.0357	0.1488
15	0.0219	0.0277	0.0333	0.1388
16	0.0201	0.0260	0.0312	0.1300
17	0.0194	0.0245	0.0294	0.1225
18	0.0183	0.0231	0.0277	0.1157
19	0.0173	0.0220	0.0263	0.1100
20	0.0164	0.0208	0.0250	0.1040
21	0.0156	0.0198	0.0235	0.0992
22	0.0149	0.0189	0.0227	0.0947
23	0.0143	0.0181	0.0217	0.0906
24	0.0137	0.0174	0.0208	0.0868
25	0.0132	0.0167	0.0200	0.0833
26	0.0126	0.0160	0.0192	0.0800
27	0.0122	0.0154	0.0185	0.0772
28	0.0117	0.0148	0.0178	0.0744
29	0.0113	0.0144	0.0173	0.0718
30	0.0110	0.0139	0.0167	0.0694
31	0.0106	0.0134	0.0161	0.0672
32	0.0103	0.0130	0.0156	0.0650
33	0.0099	0.0126	0.0151	0.0631
34	0.0097	0.0123	0.0147	0.0613
35	0.0094	0.0119	0.0143	0.0595
36	0.0092	0.0116	0.0139	0.0580

*Computed at 170 deg with water at 8.12 lb per gallon.
**Computed at 210 deg with water at 8.00 lb. per gallon.
Source: Heating & Ventilating's Engineers Data Book (The Industrial Press).

TABLE 17—DRY FLUE GAS LOSSES OF VARIOUS FUELS FOR THEIR PER CENT CO_2 AND 400 DEG FLUE GAS TEMPERATURE

Per Cent CO_2	Anthracite Coal	Bituminous Coal	Natural Gas	Fuel Oil	Propane
	Dry Flue Gas Loss, Per Cent of Heat of Fuel				
3	47.6	46.0	25.2	38.8	34.9
4	36.1	33.8	19.2	27.9	26.5
5	29.2	27.5	15.3	22.7	21.5
6	24.2	22.8	12.8	18.9	17.7
7	21.1	19.6	11.0	16.4	15.4
8	18.4	17.5	9.5	14.2	13.4
9	16.6	15.5	8.5	12.9	11.9
10	15.0	14.0	7.6	11.7	10.6
11	13.7	12.9		10.7	
12	12.5	11.8		9.8	
13	11.6	11.0			
14	10.8	10.2			
Change per 100 deg change in temp.	13.4	11.4	6.3	10.0	8.6
Heat of fuels, Btu Units	13,000 lb	14,000 lb	1,050 cu ft	19,250 lb	2,500 cu ft

Source: Fuels and Combustion Handbook, Johnson and Auth.

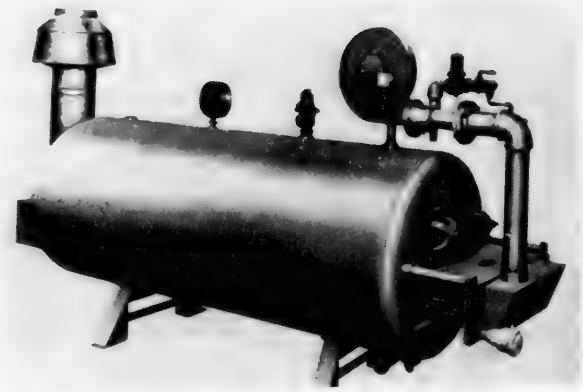


Fig. 10. Vertical type draft diverter mounted on the sheet metal flue of a horizontal water heater. Courtesy, Sellers Engineering Co., Chicago, Ill.

fired with natural gas, a breakdown of the flue gas components is listed in Table 18. Attention is invited to the water vapor content and the corresponding dewpoints of the flue gases, because of the corrosion that results when sheet metal stacks and flues are used and extended to the outside. During winter weather considerable condensation can occur: this will eat holes in sheet metal stacks in a short time. The chilled metal cools the gases, moving more slowly against the metal, well below the dewpoint resulting in condensation of the water vapor in the flue gases. From Table 18 it can be seen that a solution to this problem consists of excess air dilution of the flue gases to low percentages of CO_2 and water-vapor with low dewpoints. Table 19 complements Table 18 by showing the variations in heat losses up the stack for different stack temperatures as well as CO_2 percentages.

This dilution must not take place within the water heater or boiler, but in the draft diverter. Figure 10 illustrates a draft diverter mounted on the metal flue of a horizontal hot water heater, and Fig. 11 shows a group of different types of draft diverters that will enable them to be utilized in practically any spot, angle or arrangement with the water heater. The draft diverter, connected to a 24 in. length of vent pipe must prevent back drafts, flame lifts, pilot extinguishing and deposit of soot. It must remove all combustion products and conduct them to the stacks.

TABLE 18—COMPONENTS OF FLUE GASES OBTAINED FROM BURNING NATURAL GAS IN HOT WATER HEATERS

Per Cent CO_2 in Flue Gases	With Excess Air or Over-ventilation			
	Water Vapor, Per Cent H_2O	Oxygen, Per Cent O_2	Excess Per Cent Air,	Dewpoint of Flue Gases, Deg F
12	22.5	0	0	138
11	21.0	1.9	8	135
10	19.5	3.6	18	132
9	18.0	5.2	30	129
8	16.0	7.1	45	125
7	13.6	8.6	65	120
6	11.4	10.5	90	115
5	8.6	12.2	125	109
4	5.0	14.0	182	104

Percentages of CO_2 and O_2 are standard flue gas analyses taken with Orsat equipment on the dry water-vapor free basis. The water-vapor percentages corresponding to these analyses were added for condensation problems and are not determined by means of the Orsat flue gas analyzer nor included in the flue gas analyses.

Source: Industrial Gas, January 1955.

TABLE 19—LOSS OF HEAT UP THE STACK FOR VARIOUS FLUE GAS TEMPERATURES AND ANALYSES RESULTING FROM BURNING NATURAL GAS

Per Cent CO_2 (Excess Air)	Flue Gas Temperature, Deg F				Per Cent Loss Due to CO in Flue Gases at 300 Deg F Corresponding to Per Cent CO_2
	200	300	400	500	
	Per Cent of Fuel (Natural Gas) Lost				
12	12.0	13.2	14.8	16.0	0
11	12.3	13.5	15.4	16.9	3.4
10	12.5	14.0	16.0	17.8	7.0
9	12.8	14.6	16.8	18.7	12.0
8	13.2	15.3	17.6	19.6	
7	13.6	16.7	18.6	21.0	
6	14.2	17.2	20.2	23.0	
5	15.3	18.8	22.4	26.1	
4	16.5	21.0	25.7	30.2	
3	18.8	24.8	31.0	37.2	

Note: Tabulation taken from heat loss tables for large boilers with high stacks.

The swing type automatic check dampers are helpful in the flues of hot water boilers; Fig. 12 shows methods of installing them. In factories that have spray booths, machine operations and sanding, which uses suction fans, frequently the building is maintained in a vacuum. This condition will ruin the combustion of water heater burners with limited draft. If the plant vacuum cannot be kept broken, or the hot water boiler isolated, induced draft fans will remove the combustion products of the water boiler, as illustrated in Fig. 13. The conical cap over the outside metal chimney from this induced draft fan venting system may not give enough clearance for the gases to leave freely. Figure 14 portrays an H-head type of

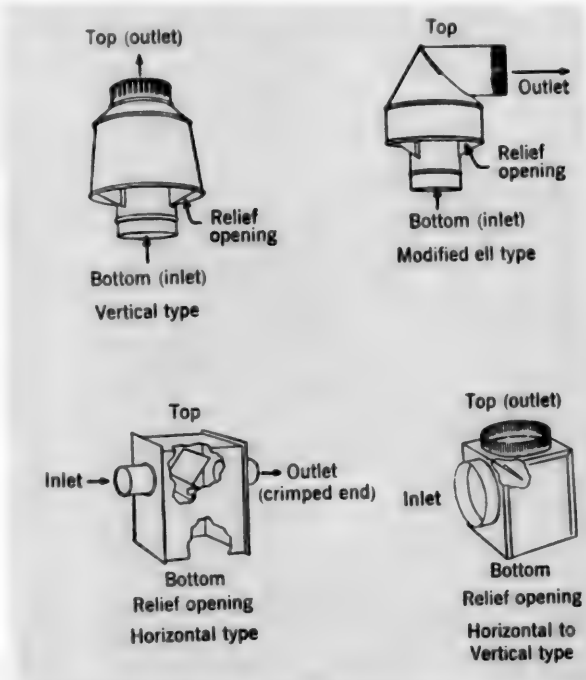


Fig. 11. Various types of draft diverters that can be adapted to hot water heaters to keep equipment and venting within space limits. Courtesy, Wilder Manufacturing Co.

TABLE 20—CAPACITIES OF ROUND FLUES AND CHIMNEYS

Capacities of chimneys and flues that can be used with industrial equipment burning gas. The input Btu capacities of gas equipment can be used for direct connection to the chimney, without diverters, as may occur with large size ovens, furnaces, and other equipment.

Diameter of Stack, Inches	Height, Feet, of Stack or Chimney from Appliance Outlet*						
	20	30	40	60	80	100	125
	Stack Capacity in Thousands of Btu per Hour						
6	210	320	430	550	700	800	800
8	680	830	960	1,100	1,250	1,350	1,500
10	1,270	1,470	1,620	1,830	1,960	2,060	2,150
12	1,860	2,170	2,410	2,740	2,960	3,120	3,280
14	2,580	3,030	3,370	3,860	4,190	4,440	4,690
16	3,380	4,000	4,450	5,140	5,620	5,970	6,320
18	4,320	5,120	5,730	6,630	7,370	7,760	8,240
20	5,370	6,380	7,160	8,240	9,170	9,820	10,400
24	7,820	9,330	10,500	12,300	13,600	14,700	15,700
30	12,400	14,800	16,800	19,700	22,000	23,800	25,600
36	17,900	21,500	24,500	29,000	32,500	35,200	38,100

Table allows for a maximum length of horizontal run of 12 diameters (length in feet equal to diameter in inches.) No elbows included in horizontal run.

*Based upon data and formulas published in Gas Age-Record, September 3, 1932.

TABLE 21—EQUIVALENT SIZES OF PARALLEL HORIZONTAL FLUES*

(1) Size of Separate Parallel Flues, Inches, Dia.	(2) Diameter of Single Chimney or Horizontal Flue, Inches						
	3	4	5	6	8	10	12
	Number of Parallel Flues of Sizes at (1), to Match Area of the Single Chimney or Flue of (2)						
3	1	1	2	3	7	10	14
4	—	1	1	2	4	6	8
5	—	—	1	1	2	3	5
6	—	—	—	1	2	2	4
8	—	—	—	—	1	1	2
10	—	—	—	—	—	1	1
12	—	—	—	—	—	—	1

*From data published in Gas Age-Record, September 3, 1932.

chimney top that this author has found very successful in maintaining a good draft on a water heater amid all types of weather and up and down-drafts. The open legs of the *H* of the head permit free flow of the air with some suction effect that helps draw the flue gases up the chimney.

Table 20 gives the capacities of round flues and chim-

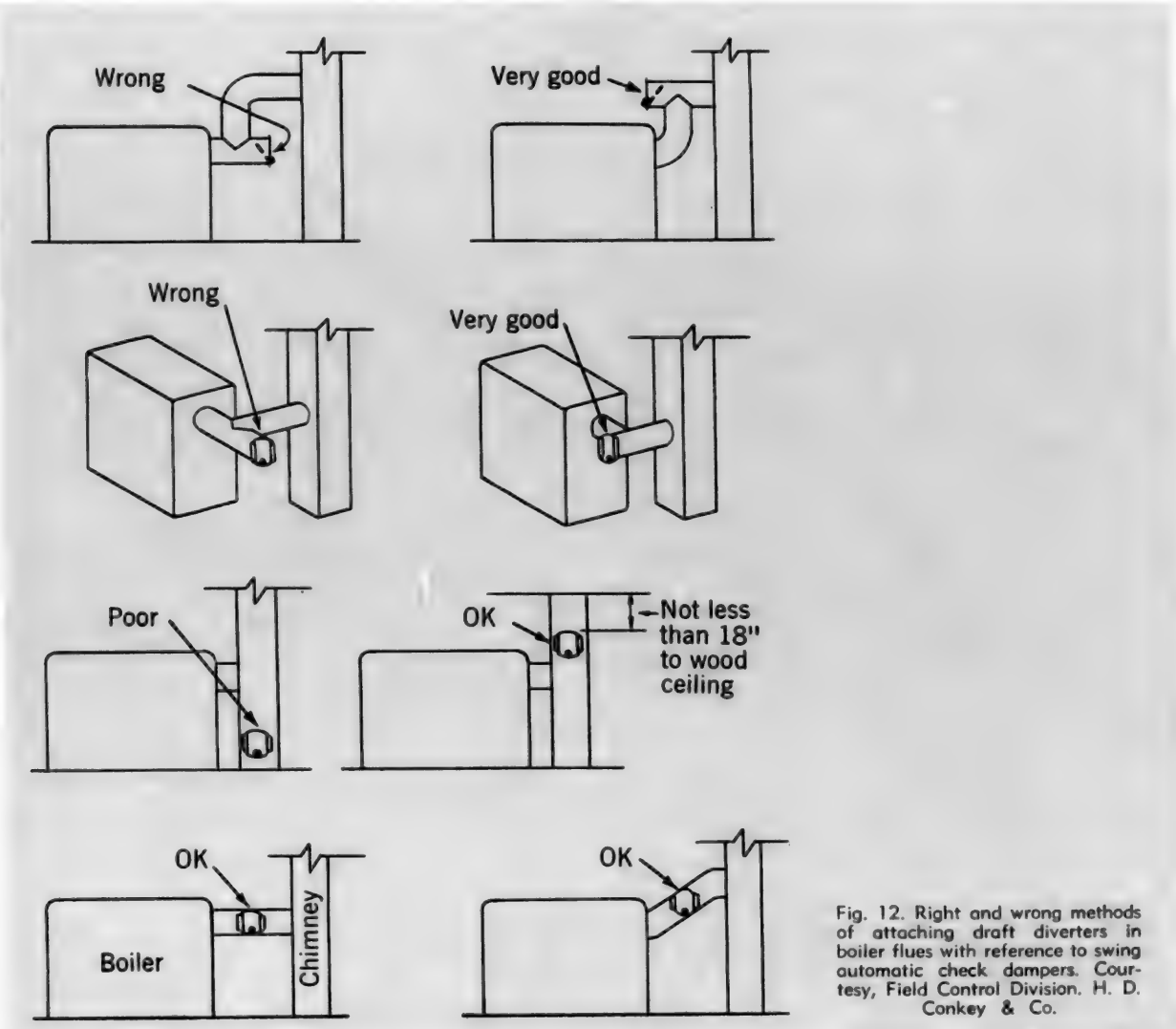


Fig. 12. Right and wrong methods of attaching draft diverters in boiler flues with reference to swing automatic check dampers. Courtesy, Field Control Division. H. D. Conkey & Co.

TABLE 22—COMPARISON OF FUELS: COAL, FUEL OIL AND GAS

Prices of these three common commercial and industrial fuels that give equivalent costs of useful output heat at average operating efficiencies. Coal, 13,000 Btu per pound as received; fuel oil, 141,000 Btu per gallon; natural gas, 1,000 Btu per cubic foot.

Cost of Useful Heat per 1,000,000 Btu	Coal Operating Efficiency			Fuel Oil Operating Efficiency			Natural Gas Operating Efficiency			Cost of Useful Heat per 1,000,000 Btu
	50%	60%	70%	60%	70%	80%	60%	70%	80%	
	Price: Dollars per Ton			Price: Cents per Gallon			Price: Cents per 1000 Cu Ft			
$2.00				17.0						$2.00
1.90				16.2	18.8					1.90
1.80				15.3	17.8					1.80
1.70				14.4	16.8	19.4				1.70
1.60	$20.80			13.6	15.8	18.2	96			1.60
1.50	19.50			12.8	14.9	17.1	90			1.50
1.40	18.20	$21.80		11.9	13.9	16.6	84	98		1.40
1.30	16.90	20.20		11.0	12.9	14.8	78	91		1.30
1.20	15.60	18.70	21.80	10.2	11.9	13.7	72	84	96	1.20
1.10	14.30	17.20	20.00	9.4	10.9	12.5	66	77	88	1.10
1.00	13.00	15.60	18.20	8.5	9.9	11.4	60	70	80	1.00
0.90	11.70	14.00	16.40	7.7	8.8	10.3	54	63	72	0.90
0.80	10.40	12.50	14.60	6.8	7.9	9.1	48	56	64	0.80
0.70	9.10	11.00	12.70	5.9	6.9	8.0	42	49	56	0.70
0.60	7.80	9.30	11.00	5.1	5.9	6.8	36	42	48	0.60
0.50	6.50	7.80	9.10	4.3	5.0	5.7	30	35	40	0.50
0.40	5.20	6.20	7.30	3.4	4.0	4.6	24	28	32	0.40

Based upon curves of Heating & Ventilating's Engineering Databook (The Industrial Press).

neys. It is important to have the chimney of ample size to permit all the gases to go freely to the outside. Once soot starts forming, carbon accumulates rapidly, because the area of the chimney grows smaller and aggravates the insufficient draft condition. It is of equal importance that the sum of all of the inside horizontal flues from a group of heaters or appliances be greater than the sum of all of the appliance outlets. Restrictions at any point produce sooting and shortage of draft. Table 21 gives the equivalent sizes of parallel horizontal flues that match a single flue. Any of the upper row of single flues or chimneys (2) will take care of the number of horizontal flues from that number of appliances, each flue of the size given in the left column (1) for this horizontal row of the tabulation. This equivalence is fundamentally based upon the areas of the flues, although length and friction reduce these areas somewhat. The area of the top single chimney sizes must never be smaller than the sum of the areas of the number given below it for each size, with the possible exception of a large number of small sizes feeding into a relatively large single chimney.

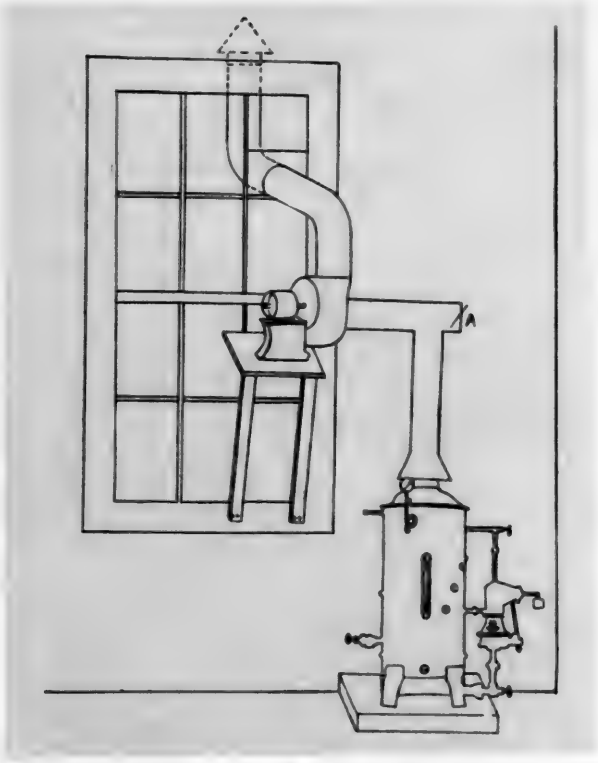


Fig. 13. Use of induced draft fan in conjunction with draft diverter and swing automatic check damper to counteract suction caused by inside exhaust fans.

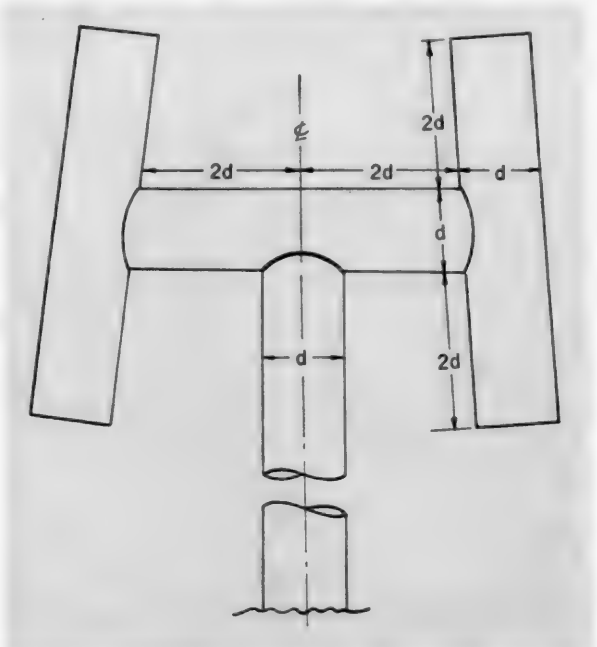


Fig. 14. Arrangement of a H-head cap to set on top of a metal chimney from a hot water heater.

Here the inside wall friction of small flues gives some compensation in the decrease of the effective areas. Otherwise combustion and draft probems may arise. For example:

	Dia, in.	Number	Area sq inches Each	Total
Single chimney at top of column..	8	1	51.3	51.3
4 in. horizontal parallel flues ...	4	4	12.7	50.8
3 in. horizontal parallel flues ...	3	7	7.4	51.8
6 in. horizontal parallel flues ...	6	1	28.9	28.9

It would be risky to use two 6 in. flues because there is not sufficient friction inside two 6 in. flues unless these were very long. On the basis of these areas, combinations of different diameters of flues connected to a single chimney can be worked out. A second 4 in. horizontal flue could be used with the one 6 in. flue, adding the 12.7 sq in. to 28.9 in. to total safe 41.6 sq in.

Table 22 includes these data by giving actual cost comparisons of the cost of coal, fuel oil and natural gas at different determined efficiencies, in supplying 1,000,000 Btu of useful heat. From this table, conversions to hot water at various temperature rises, fuels of other heat values and efficiencies, or for other media heated, can be computed. Equivalent costs are obtained along horizontal lines of the tabulation.

An Old Spanish Custom

- and the problems created for American construction in Spain

GERALD M. HOLLANDER

THE United States Government has engaged a group of technical people who are banded together under the name of A.E.S.B. (Architects and Engineers for Spanish Bases). Included in this organization is a staff of Americans responsible for the basic design and supervision of all architectural and engineering work involved in the preparation of plans to construct the various military installations.

In theory, as the original plans for this monumental task were propounded, it was intended that the staff of Americans would evaluate each job architecturally and engineering-wise, and prepare an outline design in text or sketch form, and give this information to a Spanish architectural firm to translate to finished drawings with all the necessary design calculations and details. This appeared a valid means of control since all the economic factors were determined when the project was in its initial design stage. Everything pointed to a smooth and easily controllable method of procedure.

Three Sets of Plans Submitted

According to the plan of routine, the Spanish contract architect had to prepare his work and make three submissions of plans and calculations. The first submission was complete in every respect but lacked translation into the Spanish language. The second submission was intended to show a final set of drawings corrected and changed as per A.E.S.B. criteria and to include all translations. Finally the finished product was to be delivered in the form of inked tracings. However the best made plans, and certainly these plans represented good, sound, logical thinking, are often made for naught. In the land of manana, the pure logic of the American mind hits an ancient impenetrable wall.

To better understand this barrier, it is helpful to know the construction techniques employed in the Spanish building trades. An architect is engaged to make the building plans. This he does. The finished set comprises drawings of flawless delineation and renderings, but somewhat devoid of interior dimensions and details. With a scale to guide him and a very good knowledge of local construction techniques, the construction contractor commences to build the building. He does this amazingly well and very much in conformance with the architects' ideas.

Construction and Destruction

Now for the wide deviation from American methods. When the job is quite close to completion, mechanical and electrical contractors are engaged. Since the architect made little if any provisions for this type work, destruction becomes a necessary part of construction. Walls are torn apart to provide recesses. Holes are cut through walls and floors. Pipes are put into interior light and ventilation wells. Some are exposed on the walls.

Somehow after this work is complete, not all the chipped walls and holes are repaired. The result is that while the exterior beauty of the building is preserved and the mechanical and electrical systems function in conformance to an acceptable standard for Spain, the interior can never attain a finished appearance. This type of work has been acceptable to people in Spain but not to the American engineers and architects.

Planning for the mechanical and electrical work had been a phase of development that until now was not fol-

lowed. Most of the engineers in Spain who are familiar with the construction trades are to be found in the employ of contractors and there does not appear to be any independent consultants in the field. Hence, it was soon found that many of the appurtenances intended for a particular job were either not made in Spain or else their design or use was not familiar to the embryonic group of engineers, newly gathered into the building trades industry. Much of the equipment specified by the American staff, such as convectors, console type unit heaters and package air handling equipment, for a few examples, were not used in Spain. Engineers were faced with the double task of translating fundamental engineering to the building trades parlance and also trying to use totally unfamiliar equipment. Other inconsistancies between Spanish and American design became evident. Vacuum breakers are mandatory in the United States; they are not even known in Spain. Vents for plumbing lines are regulated by law in the States. Toilets in Spain can attest to the fact that vents are considered an expensive waste of pipe.

Technical Understanding Lacking

It was soon evident. as the submissions on several of the first jobs were returned for checking, that the Spanish architects did not have the understanding nor the technical men to interpret the required designs, let alone to put the necessary information on paper. Jobs were returned with carefully traced pictures of free hand sketches. Hot water lines would be connected to flush valves, instruction notes to facilitate drafting were not only added to the tracing, but were translated to Spanish. A.E.S.B. had provided all contract architects with a detailed booklet covering the technical criteria, and a set of standard details to facilitate drafting. This information was applied to the letter, rather than evaluated for application. Since that which was required from the Spanish architect was a completely unfamiliar method of engineering, the tendency was to draw and redraw the same detail in plan and perspective, and duplicated information causing transcription error, in an attempt to fulfill the required number of drawings. No attempt was made to try to analyze what details were actually required.

An obvious reason for some of these shortcomings is the fact that there is a great distance between the professional engineer in Spain and the drafting board. Instructions are handed down through assistants to the delineator and become garbled in transit. The draftsman does not have the training to understand the meaning of what he is drawing and therefore many times completes something that is totally irrational.

Original Scheme Changed

As a result of the breakdown in the planned procedure, it was decided to alter the original scheme. In the case of mechanical and electrical work, the Spanish architectural and engineering contractors were to be employed as a drafting service. This required the making of comprehensive and detailed sketches and layouts by A.E.S.B. Naturally, the magnitude of the work on the part of American engineers was increased considerably. It was necessary to employ many more men than was originally intended.

However, after learning from its initial trials, A.E.S.B. is now mass producing all the pertinent drawings that form the necessary part of the construction of military bases. Schedules are once again being met and results are favorable to all concerned. Spaniards are benefitting from American techniques and they are learning a valuable lesson in planning. They are in an excellent position to weigh critically all that they see.

Noises in Piping and Equipment

Noise Production and Damping in Water Piping, by W. L. Rogers, assistant professor of mechanical engineering, Northwestern University, is the third in a series of progress reports on work conducted at the university. The report was presented at the 62nd Annual Meeting of ASHAE.

The noise produced in water flowing through 1-inch and 1½-inch straight pipe and various fittings was measured under laboratory conditions for sound-pressure levels by means of a microphone mounted flush with the inside surface of the pipe through a hole in a slightly flattened area of the pipe wall.

The tests indicated that water temperature had only a small effect on flow-noise production in straight pipe as long as the water remains liquid. The noise produced by fittings was found to be considerably more significant than that produced in straight pipe.

Other tests conducted were a comparison of noise levels produced by a 1-inch circulating pump, and a preliminary evaluation of sudden enlargements in the pipe as liquid-path acoustic filters.

Evaluation of Equipment Noise

Certain concepts of modern acoustical engineering were offered in another paper at the 62nd Annual Meeting of ASHAE by the authors, H. C. Hardy, assistant manager, physics research and D. E. Bishop, research physicist, acoustic design section, of the Armour Research Foundation of Illinois Institute of Technology, as a means for measuring and evaluating the noise of heating, ventilating and air-conditioning equipment.

The paper presents the elements of modern acoustical engineering techniques for handling noise measurement and control in ventilating systems. By converting sound pressure measuring data into acoustic power and its relative contribution to octave bands of frequency, it is possible, the authors write, to compute acoustical energy flow paths and the final subjective loudness heard by the listener.

This system is the basis of new standards which are being written for the measurement of equipment noise, but before it can be of ultimate use to the engineering profession, research will have to be undertaken to obtain working data in the form of charts and tables.

DIMENSIONAL AND CAPACITY DATA — SCHEDULE 80 PIPE

Diameter, In.			Wall Thickness, In.	Cross-Sectional Area, Sq. In.			Weight per Foot, Lb.		
Nominal	Actual Inside	Actual Outside		Outside	Inside	Metal	Of Pipe	Of Water in Pipe	Of Pipe and Water
1/8	0.215	0.405	0.095	0.129	0.036	0.093	0.314	0.016	0.330
1/4	0.302	0.540	0.119	0.229	0.072	0.157	0.535	0.031	0.566
3/8	0.423	0.675	0.126	0.358	0.141	0.217	0.738	0.061	0.799
1/2	0.546	0.840	0.147	0.554	0.234	0.320	1.087	0.102	1.189
3/4	0.742	1.050	0.154	0.866	0.433	0.433	1.473	0.213	1.686
1	0.957	1.315	0.179	1.358	0.719	0.639	2.171	0.312	2.483
1 1/4	1.278	1.660	0.191	2.164	1.283	0.881	2.996	0.555	3.551
1 1/2	1.500	1.900	0.200	2.835	1.767	1.068	3.631	0.765	4.396
2	1.939	2.375	0.218	4.431	2.954	1.477	5.022	1.280	6.302
2 1/2	2.323	2.875	0.276	6.492	4.238	2.254	7.661	1.830	9.491
3	2.900	3.500	0.300	9.621	6.605	3.016	10.252	2.870	13.122
3 1/2	3.364	4.000	0.318	12.568	8.890	3.678	12.505	3.720	16.225
4	3.826	4.500	0.337	15.903	11.496	4.407	14.983	4.970	19.953
5	4.813	5.563	0.375	24.308	18.196	6.112	20.778	7.940	28.718
6	5.761	6.625	0.432	34.474	26.069	8.405	28.573	11.300	39.873
8	7.625	8.625	0.500	58.426	45.666	12.760	43.388	19.800	63.188
10	9.564	10.750	0.593	90.79	71.87	18.92	64.400	31.130	95.530
12	11.376	12.750	0.687	127.67	101.64	26.03	88.600	44.040	132.640
14	12.500	14.000	0.750	153.94	122.72	31.22	107.000	53.180	160.180
16	14.314	16.000	0.843	201.06	160.92	40.14	137.000	69.730	206.730
18	16.126	18.000	0.937	254.47	204.24	50.23	171.000	88.500	259.500
20	17.938	20.000	1.031	314.16	252.72	61.44	209.000	109.510	318.510

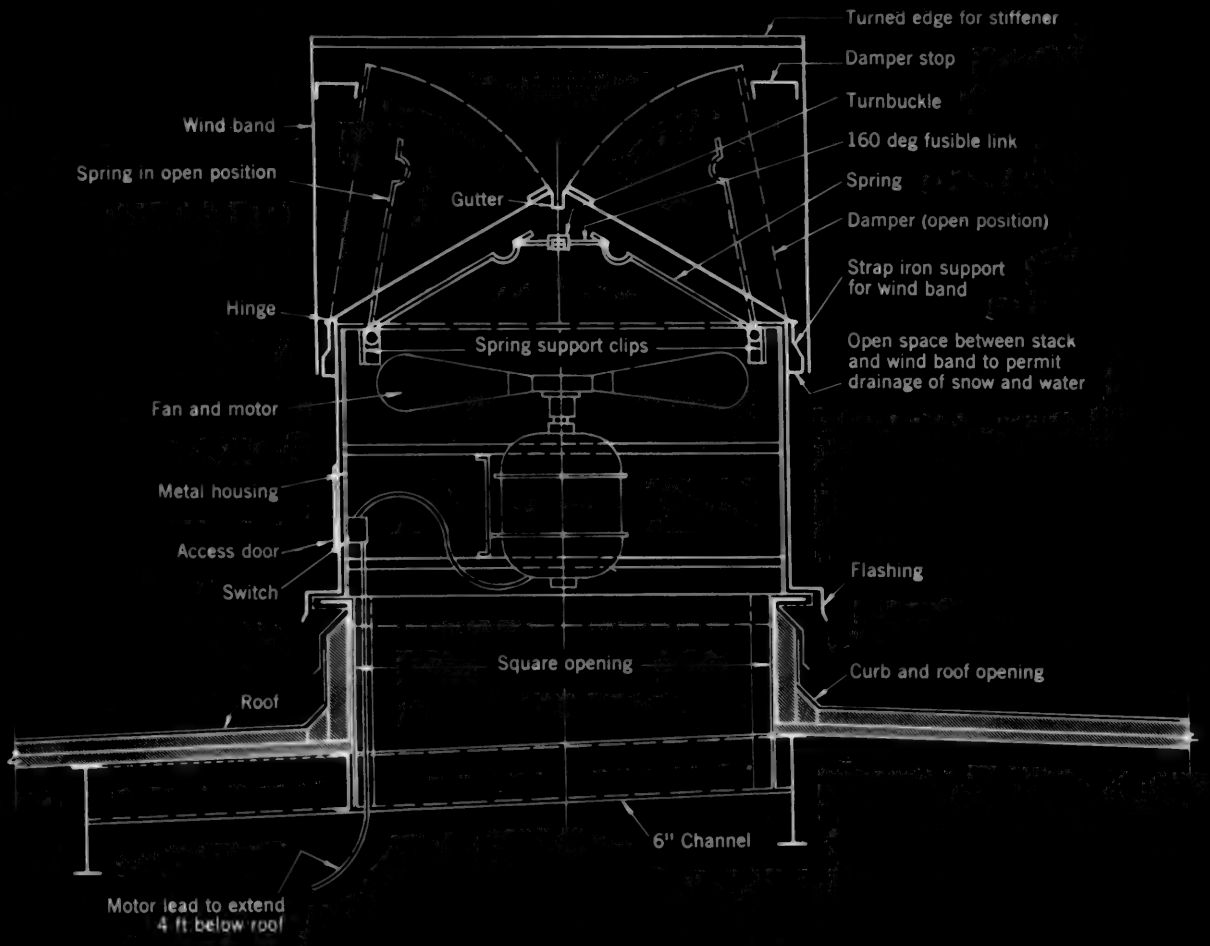
Nominal Dia., In.	Circumference, Inches		Sq. Ft. of Surface per Lineal Foot		Contents of Pipe per Lineal Foot		Lineal Foot to Contain		
	Outside	Inside	Outside	Inside	Cu. Ft.	Gal.	1 Cu. Ft.	1 Gal.	1 Lb. of Water
1/8	1.27	0.675	0.106	0.056	0.00033	0.0019	3070	527	101.01
1/4	1.69	0.943	0.141	0.079	0.00052	0.0037	1920	271	32.26
3/8	2.12	1.328	0.177	0.111	0.00098	0.0073	1370	137	16.39
1/2	2.65	1.715	0.221	0.143	0.00162	0.0122	616	82	9.80
3/4	3.29	2.330	0.275	0.194	0.00300	0.0255	334	39.2	4.69
1	4.13	3.010	0.344	0.251	0.00500	0.0374	200	26.8	3.21
1 1/4	5.21	4.010	0.435	0.334	0.00880	0.0666	114	15.0	1.80
1 1/2	5.96	4.720	0.497	0.393	0.01230	0.0918	81.50	10.90	1.31
2	7.46	6.090	0.622	0.507	0.02060	0.1535	49.80	6.52	0.78
2 1/2	9.03	7.320	0.753	0.610	0.02940	0.220	34.00	4.55	0.55
3	10.96	9.120	0.916	0.760	0.0460	0.344	21.70	2.91	0.35
3 1/2	12.56	10.580	1.047	0.882	0.0617	0.458	16.25	2.18	0.27
4	14.13	12.020	1.178	1.002	0.0800	0.597	12.50	1.675	0.20
5	17.47	15.150	1.456	1.262	0.1260	0.947	7.95	1.055	0.13
6	20.81	18.100	1.734	1.510	0.1820	1.355	5.50	0.738	0.09
8	27.09	24.000	2.258	2.000	0.3180	2.380	3.14	0.420	0.05
10	33.77	30.050	2.814	2.503	0.5560	4.165	1.80	0.241	0.03
12	40.05	35.720	3.370	2.975	0.7060	5.280	1.42	0.189	0.02
14	47.12	39.270	3.930	3.271	0.8520	6.380	1.18	0.157	0.019
16	53.41	44.970	4.440	3.746	1.1170	8.360	0.895	0.119	0.014
18	56.55	50.660	4.712	4.220	1.4180	10.610	0.705	0.094	0.011
20	62.83	56.350	5.236	4.694	1.7550	13.130	0.570	0.076	0.009

DIMENSIONAL AND CAPACITY DATA — SCHEDULE 40 PIPE

Diameter, Inches			Wall Thickness, In.	Cross-Sectional Area, Sq. In.			Weight per Foot, Lb.		
Nominal	Actual Inside	Actual Outside		Outside	Inside	Metal	Of Pipe Alone	Of Water in Pipe	Of Pipe and Water
1/8	0.269	0.405	0.068	0.129	0.057	0.072	0.25	0.028	0.278
1/4	0.364	0.540	0.088	0.229	0.104	0.125	0.43	0.045	0.475
3/8	0.493	0.675	0.091	0.358	0.191	0.167	0.57	0.083	0.653
1/2	0.622	0.840	0.109	0.554	0.304	0.250	0.86	0.132	0.992
3/4	0.824	1.050	0.113	0.866	0.533	0.333	1.14	0.232	1.372
1	1.049	1.315	0.133	1.358	0.864	0.494	1.68	0.375	2.055
1 1/4	1.380	1.660	0.140	2.164	1.495	0.669	2.28	0.649	2.929
1 1/2	1.610	1.900	0.145	2.835	2.036	0.799	2.72	0.882	3.602
2	2.067	2.375	0.154	4.431	3.356	1.075	3.66	1.454	5.114
2 1/2	2.469	2.875	0.203	6.492	4.788	1.704	5.80	2.073	7.873
3	3.068	3.500	0.216	9.621	7.393	2.228	7.58	3.201	10.781
3 1/2	3.548	4.000	0.226	12.568	9.888	2.680	9.11	4.287	13.397
4	4.026	4.500	0.237	15.903	12.730	3.173	10.80	5.516	16.316
5	5.047	5.563	0.258	24.308	20.004	4.304	14.70	8.674	23.374
6	6.065	6.625	0.280	34.474	28.890	5.584	19.00	12.52	31.52
8	7.981	8.625	0.322	58.426	50.030	8.396	28.60	21.68	50.28
10	10.020	10.750	0.365	90.79	78.85	11.90	40.50	34.16	74.66
12	11.938	12.750	0.406	127.67	113.09	15.77	53.60	48.50	102.10
14	13.126	14.000	0.437	153.94	135.33	18.61	63.30	58.64	121.94
16	15.000	16.000	0.500	201.06	176.71	24.35	82.80	76.58	159.38
18	16.876	18.000	0.562	254.47	223.68	30.79	105.00	96.93	201.93
20	18.814	20.000	0.593	314.16	278.01	36.15	123.00	120.46	243.46

Nominal Dia., In.	Circumference, Inches		Sq. Ft. of Surface per Lineal Foot		Contents of Pipe per Lineal Foot		Lineal Feet to Contain		
	Outside	Inside	Outside	Inside	Cu. Ft.	Gal.	1 Cu. Ft.	1 Gal.	1 Lb. of Water
1/8	1.27	0.84	0.106	0.070	0.0004	0.003	2533.775	338.74	35.714
1/4	1.69	1.14	0.141	0.095	0.0007	0.005	1383.789	185.00	22.222
3/8	2.12	1.55	0.177	0.129	0.0013	0.010	754.360	100.85	12.048
1/2	2.65	1.95	0.221	0.167	0.0021	0.016	473.906	63.36	7.576
3/4	3.29	2.58	0.275	0.215	0.0037	0.028	270.034	36.10	4.310
1	4.13	3.29	0.344	0.274	0.0062	0.045	166.618	22.28	2.667
1 1/4	5.21	4.33	0.435	0.361	0.0104	0.077	96.275	12.87	1.541
1 1/2	5.96	5.06	0.497	0.422	0.0141	0.106	70.733	9.46	1.134
2	7.46	6.49	0.622	0.540	0.0233	0.174	42.913	5.74	0.688
2 1/2	9.03	7.75	0.753	0.654	0.0332	0.248	30.077	4.02	0.482
3	10.96	9.63	0.916	0.803	0.0514	0.383	19.479	2.60	0.312
3 1/2	12.56	11.14	1.047	0.928	0.0682	0.513	14.565	1.95	0.233
4	14.13	12.64	1.178	1.052	0.0884	0.660	11.312	1.51	0.181
5	17.47	15.84	1.456	1.319	0.1390	1.040	7.198	0.96	0.115
6	20.81	19.05	1.734	1.585	0.2010	1.500	4.984	0.67	0.080
8	27.09	25.07	2.258	2.090	0.3480	2.600	2.878	0.38	0.046
10	33.77	31.47	2.814	2.622	0.5470	4.100	1.826	0.24	0.029
12	40.05	37.70	3.370	3.140	0.7850	5.870	1.273	0.17	0.021
14	47.12	44.76	3.930	3.722	1.0690	7.030	1.067	0.14	0.017
16	53.41	51.52	4.440	4.310	1.3920	9.180	0.814	0.11	0.013
18	56.55	53.00	4.712	4.420	1.5530	11.120	0.644	0.09	0.010
20	62.83	59.09	5.236	4.920	1.9250	14.400	0.517	0.07	0.008

SUMMER AIR EXHAUST UNIT



DETAIL OF SUMMER EXHAUST UNIT FOR LARGE BUILDINGS WITH FLAT ROOFS

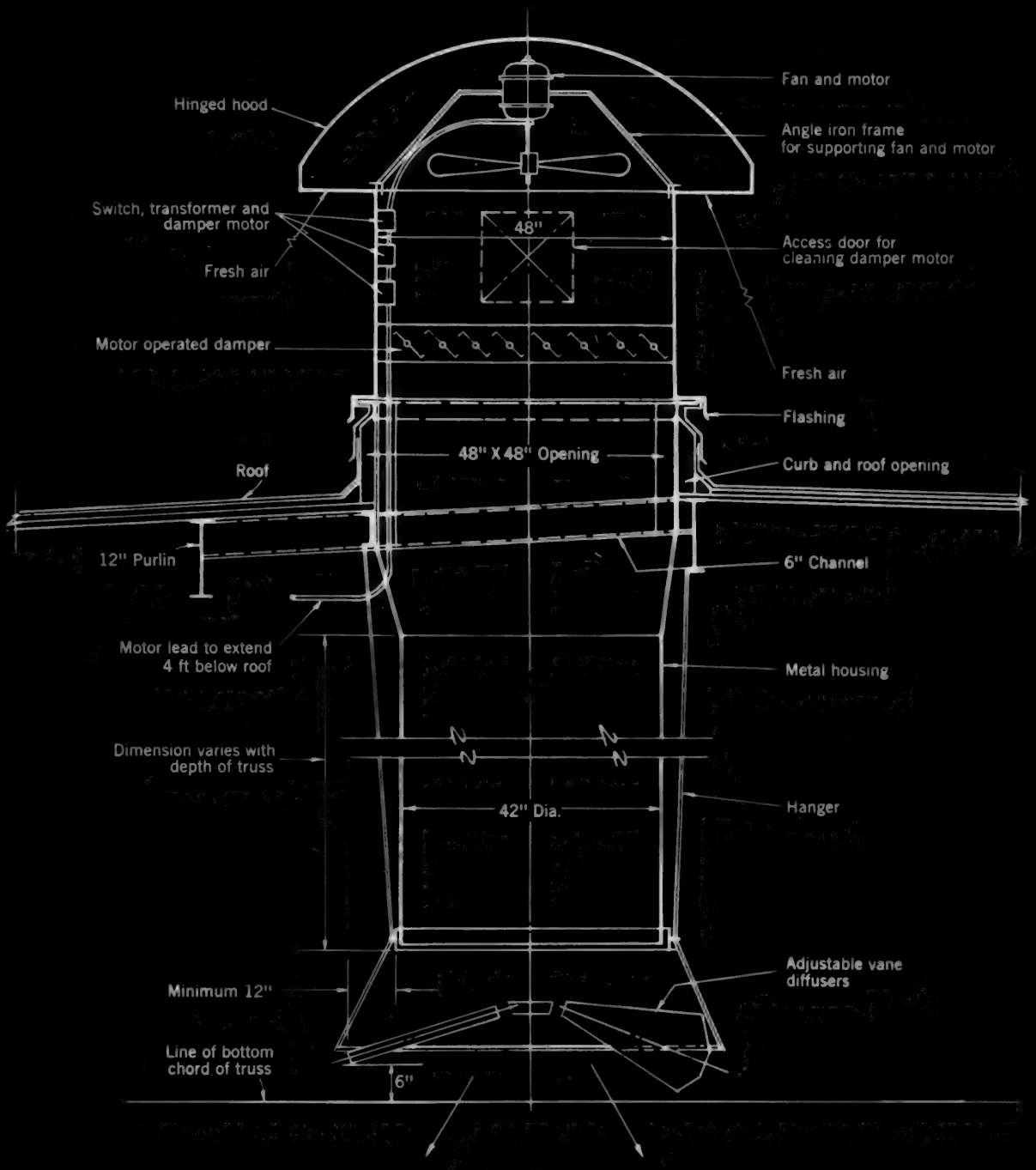
This unit is for exhausting air from a building in the summer, particularly in buildings of large size with flat roofs. The number required is dependent upon how much temperature rise can be allowed in the building above outside temperature. In general, roughly one 20,000 cfm unit is required for each 10,000 sq ft of floor space for a 10 deg F rise in the building.

When the fan is started, the hinged louvers are pushed open by the air flow and they remain open as long as the fan is running. Also this unit has a spring attachment which is equipped with a fusible link. When this link lets go in case of a fire, the springs automatically open if the fan is not running.

DRAWINGS THROUGH THE COOPERATION OF
ALBERT KAHN ASSOCIATED ARCHITECTS AND ENGINEERS, INC.

CUT ALONG THIS LINE

SUMMER AIR SUPPLY UNIT



DETAIL OF SUMMER SUPPLY UNIT

This unit, of standard manufacture, is for supplying fresh air in summer only and is made and used in the same sizes as the winter supply units. It has a two-position starter which is marked "On" and "Off." When the unit is started it energizes the fan motor and the damper motor which opens the damper blades. When the unit is stopped, the damper motor, which is of the spring return type, shuts the damper blades and prevents any air from entering the building when not required.

ACH&V's *Ad-Digest* AND PRODUCT INFORMATION SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement.

NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

STEAM TRAPS. Inside Front Cover. Inverted bucket steam traps made by this company were installed in the vacuum return system of a large Masonic Temple in Detroit which formerly had a maximum vacuum of 4 in. of water but now seldom shows less than 15 in. of water. A 11-page steam trap book and two reprints on trap operation are available. . **Item 108**

ROOF VENTILATORS. Page 1. Three low-silhouette roof ventilators are being made by this company to blend with modern architecture. The three are a centrifugal for quiet operation, a vertical discharge for oil or grease laden air, and a third for normal industrial air. A catalog on each model is available. ..... **Item 109**

PERIMETER HEATING. Page 2. Forced hot water, perimeter heating, wall convectors are manufactured by this company for installation along exposed walls, with simplified piping and fewer risers. The company's convectors were installed in six new dormitories at Cornell University. Information is available. ... **Item 110**

RELIEF VALVES. Page 4. Automatic, self-closing, temperature and pressure relief valves are made by this company for hot water supply systems according to AGA and ASME codes. Models are available with an extension thermostat in three lengths and a fourth model with a short thermostat, in sizes from 75 to 150 lb steam pressure. Descriptive sheet is available. ..... **Item 111**

HEAT FLOW BY RADIATION. Page 7. A 18-page brochure is offered by this company containing a discussion of the newest theories and practices, with experiments and explanations of the fundamental laws of physics involved in the field of heat flow, vapor flow, and condensation. ..... **Item 112**

CENTRIFUGAL FANS. Page 9. Six of this company's centrifugal fans with a total capacity of 375,000 cfm, powered by 25-hp motors, draw the large volume of air through the air washers of an aircraft company's paint spray hangar. Engineering advice is offered. ..... **Item 113**

PERIMETER RADIATION. Page 11. Eight types of perimeter radiation elements, with corrugated aluminum fins, are offered by this manufacturer in a wide range of capacities for steam or hot water. Accessories for finishing short-of-wall, wall-to-wall, or around corners and columns are also available. Information is available. ..... **Item 114**

REFRIGERANTS. Pages 12-13. A line of refrigerants is manufactured by this company with low moisture content and low percentages of non-condensable gases. Four different types are offered for equipment ranging from window air conditioners to 25-ton and larger centrifugal compressors. Information is available. ..... **Item 115**

SPACE HEATING EQUIPMENT. Pages 14-15. Equipment that heats and circulates water for space heating and snow melting is offered by this company. The equipment includes heat exchangers with either 2 or 4 passes and booster pumps which can be separated into three parts for servicing. Information and bulletin are available. ..... **Item 116**

GALVANIZED SHEETS. Page 16. Galvanized sheet that can be worked without chipping or flaking is made by this company with a ductile and tight coat on its continuous galvanizing line. The company stocks such items as sheets, furnace pipe, and snap lock or closed seam perimeter heating for air conditioning pipe and accessories. Details are available. .. **Item 117**

WELDING FITTINGS. Between 16-17. Welding fittings and flanges are made by this manufacturer to meet all U. S. piping code specifications. The company offers engineering service and nearby distributor facilities. Each product is identified by size and materials designation. Information is available. ..... **Item 118**

FANS AND BLOWERS. Page 17. Every fan or blower leaving this company's plant is unconditionally guaranteed to meet the established industry test codes of NAFM and PFMA. A bulletin is offered on fans and forward curved blowers, and another bulletin gives data on backward curved blowers from 12½ to 36½ in. .... **Item 119**

COOLING TOWERS. Page 18. A high temperature, baked plastic finish that resists rust and corrosion and defies the attack of acids, alkalis, and water, is given to this company's cooling towers to protect them from damage in storage, on their way to the job, and during installation. Each tower comes complete with installation instructions. Literature is available. ..... **Item 120**

POWER ROOF VENTILATORS. Page 19. Power roof ventilators are made with an overlap of wheel and inlet cone to prevent loss of air and efficiency. They are available in 13 sizes, belt driven, 15 to 59½ in, and direct driven type. Both belt and direct drive ventilating sets are also made by the company. Catalogs on both types are available. ..... **Item 121**

IRON DRAIN PIPE. Page 20. High silicon, iron pipe is fabricated by this company for corrosive waste disposal systems. The material resists practically all commercial acids and other corrosive solutions. A complete line of pipe and fittings is available. Information is offered. . **Item 122**

HIGH VELOCITY AIR SYSTEMS. Page 21. Shown here are two ways of using this manufacturer's high velocity system of air distribution for heating and ventilating schools. The high velocity system can be installed by the sheet metal trades; no supply or return pipes are required. Write on business letterhead for high velocity unit selection manual. ..... **Item 123**

AIR FILTERS. Page 22. Common diseases of air filters, air filter accessories, and grease filters and Universal Laboratories' approval are discussed by a filter engineer. Information on air filters is available. ..... **Item 124**

AIR CONDITIONING CONTROL. Page 23. Year-round air conditioning control systems are offered by this company to provide maximum thermal comfort and fuel savings; low operating and maintenance cost; and reliable control with a minimum of repairs. Assistance is offered on temperature and humidity control problems. ..... **Item 125**

INDIVIDUAL ROOM HEATING. Page 25. Individual room temperature control by thermostats is a feature of this company's low pressure steam heating system. No electricity is used for the thermostats or for the fans in each room unit. The system automatically compensates for heat gains and losses. Literature is available. ..... **Item 126**

DUCT INSULATION. Page 26. A resilient glass fiber insulation is made by this company for thermal, acoustical and vapor barrier problems of ducts. No vapor barrier is necessary with the insulation on the inside of the duct. A duct liner is also available from the company. Information is available. ..... **Item 127**

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107			
108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
196	197	198	199	200	201	202	203	204	205	206	207	208	209								

PLEASE PRINT Apr. H-56

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Name ..... **Title** .....

Firm .....

Nature of Firm's Business .....

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City ..... **Zone** ..... **State** .....

This card is void after July 1, 1956

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers. ▶

Ad-Digest

AND PRODUCT INFORMATION SERVICE

AIR DIFFUSERS. Page 27. Square and slotted series of air diffusers are added to this company's line. Two models and eight sizes of square diffusers are available with neck diameters from 4 to 14 in. and capacities from 50 to 1250 cfm. Adjustable, uni-directional and multi-directional models of slotted diffusers are available in modules of 2, 3, 4, and 6 ft. Bulletin is available. ----------**Item 128**

HEATING SYSTEMS. Pages 28-29. Controlled heating systems are offered by this company for schools, hospitals, churches, apartments, and commercial and public buildings of every type. They are available in five types and cover the complete range of vacuum and vapor heating requirements. Bulletins are available. ----------**Item 129**

CENTRAL AIR CONDITIONING. Page 30. Using this company's multi-zone air conditioners, a 20-story insurance building in Texas is divided into four zones which can be controlled separately to allow individual comfort levels. Packaged air conditioners are also available from the company in addition to its central systems. Information and engineering assistance are available. ----------**Item 130**

BALL BEARING PILLOW BLOCKS. Page 31. Ball bearing pillow blocks are specifically designed by this company for air conditioning units with fan shafts up to an inch in diameter. The bearing slip fits onto shafts and is locked by a quarter turn of a collar. The housing is installed with two bolts. Six-page bulletin is available. ----------**Item 131**

AIR CONDITIONING UNITS. Pages 32-33. Air conditioning units from 1½ to 106 tons feature an adjustable motor base; motor mounts on front, back, or either end; fan discharge can be front, top, or rear; and interchangeable accessories between horizontal and vertical units. The units are available with capacities up to 19,000 cfm. Information is available. ---------**Item 132**

ROOF FAN. Page 34. Roof fans with hinged, circular spun hoods and fan venturi with a directional baffle are available from this company with direct drives from 400 to 34,000 cfm or with belt drives from 4000 to 20,150 cfm. Catalog with specifications is available. ----------**Item 133**

STEAM GENERATORS. Page 35. Steam generators are offered by this manufacturer in 18 sizes from 20 to 600 bhp for fully automatic operation burning oil or gas, or both, for pressures to 250 psi. The units have a thermal efficiency of 80% guaranteed. Catalog is available. **Item 134**

TEMPERATURE REGULATOR. Page 36. A thermostatic temperature regulator is offered by this manufacturer for automatically regulating the flow of liquid or steam through a valve, such as in steam tables. Shower mixing valves, water controllers, and tempering valves are also made by the company. Information is available. ----------**Item 135**

AIR FILTERS. Page 37. The glass fiber, air filters manufactured by this company have a lighter-to-heavier density of filter media from front to back. The filters are being planned for a new surgical dressings research and manufacturing plant. Information is available. ---------**Item 136**

MOTOR CONTROLS. Page 38. The motor controls and accessories for refrigeration and air conditioning offered by this manufacturer include a line of motor starters, temperature controls, pressure switches, pneumatic timers, pressure cutouts, and selector switches. Bulletins on the various controls are available. ----------**Item 137**

BOILERS. Page 39. Integral-furnace boilers are available in standard sizes to 40,000 lb steam per hr at pressures to 235 psi. The boilers have automatic operation, fuel-air ratio control, and smoke control. Two of them have been in service for the past two years supplying all the needs of a railroad station. Information is available. ----------**Item 138**

UNDERGROUND PIPE INSULATION. Page 40. Waterproof insulation is made by this company for steam and hot water distribution lines, for chilled water or refrigerant lines, for fuel oil lines, for condensate return lines, and for radiant heat panels. The insulation can be installed in four steps. Information and specifications are available. ----------**Item 139**

AIR FILTERS. Page 42. Substitute air filters mean contributions to the junk pile and higher cost. Get air filters that handle more air with a greater dirt-holding capacity. These filters with their heavier frames, reinforcing rods, and other features insure that each unit will continue to operate. Complete catalog information is available. ----------**Item 140**

BOILER WATER FEEDER. Page 43. A boiler water feeder was added to the boiler of a Chicago auto dealer after the system was flooded from an opened hand fill valve. The feeder performs the mechanical task of adding water automatically to keep the boiler operating safely. It is made for boilers to 35 lb. Information is available. ----------**Item 141**

REFRIGERATION TUBING. Page 44. Copper tubing is made for air conditioning and refrigeration equipment by this fabricator with inside and outside diameters to tolerances within thousandths of an inch. Type L copper tube, soft copper refrigeration tube, and wrought copper solder joint fittings are available from the manufacturer. ----------**Item 142**

UNDERGROUND PIPE INSULATION. Page 45. This triple-zone, hot underground pipe insulation consists of an inner simiplastic core fused on by the pipe's heat, a middle sintered zone of particles, and a final zone of granule thermal insulation. It is installed by pouring, tamping down and back filling. Information is available ----------**Item 143**

RIB-TYPE MOTORS. Page 46. The ribbed frames of these TEFC motors provide more cooling surface to prevent the insulation from failing under normal conditions. The motors are made as new machinery components or as replacements. Information on particular applications of the motors is available. ---------**Item 144**

AUTOMATIC CONTROLS. Page 47. Automatic, electric-electronic controls are made by this company for the control of temperature in individual rooms of buildings having extensive window areas, such as schools. Continuous slot air diffusers are also made by the company for the control of air distribution. Information is available. ----------**Item 145**

SCOTCH TYPE BOILERS. Page 48. This company's Scotch type boilers were selected for a new boys' school because they can fit in limited boiler room, can handle fluctuating loads, and are rated on nominal capacity, with adequate power to take care of emergencies and expansion. Information is available. ----------**Item 146**

CAST STEEL VALVES. Page 49. Cast steel valves are offered by this company for power generation and industrial processing installations with any required combination of casting alloys and seating metals for service to 600 lb and 1000 deg F. Catalog with specifications is available. **Item 147**

STEEL PIPE. Page 50. The uniform ductility of this company's pipe permits better fitting to contours, no work slow downs, and no special equipment is needed. The pipe has uniform wall thickness and size and is uniform in strength and toughness. Information is available. ---------**Item 148**

DUCT FURNACES. Page 51. Sectional duct furnaces are made by this company in sizes from 150,000 to 300,000 Btu per hr, and may be installed in multiple banks. Cabinet blowers are also made by the company in four sizes from 1000 to 8000 cfm. Bulletins with specifications are available. ----------**Item 149**

DUST COLLECTOR. Page 52. A dust collector with an improved exhaust hood design and a 50-cfm air volume capacity is manufactured by this company for industrial dust control problems such as conveying, screening, grinding, weighing, or packing dry materials. Information is available. ----------**Item 150**

PACKAGE LIQUID COOLER. Page 53. This package liquid cooler is a complete cooling unit for homes, apartments, commercial and industrial buildings. Low pressure drop through evaporator, non-recycling pump down, integrated electrical control system, and complete wiring are a few of its features. Bulletin and complete file of cooling equipment literature is available. ----------**Item 151**

DUCT INSULATION. Page 54. Available in compressed rolls up to 72 in. wide in standard thicknesses and lengths, this company's glass fiber duct insulation is cut with an ordinary knife, needs no special measuring, and can be wrapped around ducts and supporting hangers. ---**Item 152**

1956 ENGINEERING GUIDE. Page 55. The 1956 guide for air conditioning, heating, ventilating, and piping engineers has a 1176-page technical data section and a 498-page catalog data section. The guide sections are divided into seven categories. Information is available. ---------**Item 153**

ELECTROSTATIC AIR FILTER. Page 56. Based on the electrostatic principle of precipitation, these air filters remove dust, smoke, soot, and microscopic particles from the air. Operating on standard house current, the precipitator may be installed in any forced air circulating system. Bulletins on industrial and residential units are available. ----------**Item 154**

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BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING

93 WORTH STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE

COPPER TUBE. Page 57. Copper tube depots are maintained by this fabricator throughout the country so that customers' warehouses are within easy reach of a depot to meet even the most urgent orders. The company makes tubing and only tubing in modern, integrated mills. Information is available. ----------**Item 155**

AXIAL FANS. Page 58. An axial fan made by this manufacturer is an integral part of the duct in which it is installed. One can choose from a standard line of over 136 models, specially designed to meet the needs of modern industry. Bulletin is available. ----------**Item 156**

AIR-COOLED CONDENSER. Page 59. A remote-type, air-cooled condenser was installed by this manufacturer in the 100-ton air conditioning system of a Texas super market. The company's experience in the proper use of air as a condenser coolant is offered. Bulletin is available. ..**Item 157**

REFRIGERATING MACHINES. Page 60. Eight of this company's refrigerating machines were installed recently to air condition an 11-story Texas building. The compressors have the company's 9-cylinder design. The company manufactures a full line of air conditioning and refrigerating machinery. Estimates and a bulletin are available. ----------**Item 158**

CONDENSATION PUMPS. Page 61. The line of condensation pumps offered by this manufacturer includes a vertical pump, a duplex unit with two float switches, a pump designed for below floor level returns, a pump for pressures from 10 to 75 lb, and a high pressure turbine for pressures to 150 lb and boilers to 250 hp. A bulletin describing each pump is available. ----------**Item 159**

CAST IRON BOILERS. Page 64. Cast iron boilers are made by this company to offer economy of operation, neglible maintenance expense, ease of conversion to different fuels and ready expansibility. Gas-fired boilers are made for today's modern home heating plan. Information is available. ----------**Item 160**

HOT WATER HEATING EQUIPMENT. Page 65. A complete line of equipment for hot water heating systems is offered by this company. Bulletins on high head circulators, flow control valves, expansion tanks, flow tees, circulator valve, and wall radiation are available. ----------**Item 161**

HEAT EXCHANGERS. Page 67. Electronics is used in expanding tube ends into the tube sheet of these shell and tube heat exchangers so that the circumference of each tube is joined to the face of the exchanger with the same pressure. This minimizes the possibility of leaks developing. Information is available. ---------**Item 162**

COPPER WATER TUBE. Page 121. Long lengths of tube, and solder fittings requiring no wrench room or thread cutting are attributes that make copper tube suitable for radiant panel heating, hot and cold water lines, processing lines, underground service lines, drain, waste and vent lines. Information is available. ----------**Item 163**

AUTOMATIC AIR FILTER. Page 125. A roll-type air filter that automatically introduces clean filter media when dust increases the operating resistance is manufactured by this company in 65-ft lengths that compress into a 13-in. diameter roll. Under normal operating conditions, one roll is a year's supply for an 11-ft high section. Bulletin is available. ----------**Item 164**

UNIT AIR CONDITIONERS. Page 127. The unit air conditioners made by this company heat with hot water from a central boiler, cool with cold water from a central chiller, and ventilate rooms during intermediate seasons. Ceiling, overhead, concealed, and console models are available. Bulletin is offered. ----------**Item 165**

AIR CONDITIONING SYSTEMS. Page 129. An air defense radar tower off the Texas shore has an air conditioning system of packaged chiller units designed and installed by this company. The company provides systems for buildings, offices, and stores of every kind. Information is available. ----------**Item 166**

PLASTIC PIPING. Page 131. The polyethylene pipe and plastic insert fittings of this company were installed on the hydrochloric acid lines to zinc-plating tanks of a storage battery builder. On battery test tanks, the plastic piping is exposed to built-up sulfuric acid concentrations. Facts about plastic pipe and fittings are available. ----------**Item 167**

VALVES AND TRAPS. Page 133. Thousands of this company's valves and traps were installed in four housing projects, comprising 41 buildings containing more than 20,000 rooms in Newark, N. J. The company makes a combination radiator valve and thermostatic trap, and a float and thermostatic trap. Information is available. ----------**Item 168**

INSULATED PIPING SYSTEMS. Page 135. For hot underground piping systems that are turned on and off, this company offers prefabricated, insulated piping systems to prevent damage from corrosion and to protect against the thermal shock of turning the system on and off. Catalog is available. ----------**Item 169**

BOILERS. Page 137. Forced draft with 4-pass construction, hinged or davited front and rear doors for fast cleaning, 10-second gas or oil interchange are a few of the features of these boilers, made in sizes from 15 to 600 hp and 15 to 250 psi. Catalog is available. ----------**Item 170**

SHOWER CONTROL. Page 139. A thermostatic shower control is made by this company for homes, clubs, schools, hotels, and hospitals to prevent the flow of water above 110 deg F. If cold water fails, the valve shuts off the shower. It is available in concealed models to simplify piping and tile work. Bulletin and prices are available. ----------**Item 171**

COOLING TOWERS. Page 141. Induced draft cooling towers are being equipped by this company with permanently sealed and lubricated fan bearings to eliminate moisture and periodic greasing. The towers have 4-blade, deep-pitch fans to cut down the noise level. Bulletin is available. ----------**Item 172**

HOT WATER HEATERS. Page 143. A line of instantaneous heaters, heat exchangers, hot water storage heaters, and convertors is offered by this manufacturer. Catalogs and the name of the nearest company representative are available. ---------**Item 173**

DUAL PURPOSE CONTROLS. Page 144. Pressure type controls are available in 17 operating ranges from 0-30 in. of vacuum to 300-2500 psi. Temperature types are available in 11 operating ranges from minus 30-60 deg F to 370-530 deg. All are equipped with external adjustments and visible calibrated dials. Bulletin is available. ----------**Item 174**

PACKAGED BOILER. Page 145. A packaged boiler is offered by this company in sizes from 4000 to 40,000 lb steam per hr; pressures to 500 psi; for oil or gas; completely shop-assembled; and requiring a simple concrete slab. Catalog with specifications and information on dimensions, construction details and control. **Item 175**

EXHAUST HOSE. Page 146. The flexible hose made by this company can be used for fume exhaust, for dust or chip collection, for ventilation, or for handling bulky material. Bulletins giving data on flow characteristics, installation procedure, sizes, fittings and accessories are available from the company. ----------**Item 176**

BRONZE GLOBE VALVE. Page 147. A bronze valve is made by this company for 150 psi steam at 500 deg F and 300 psi for cold water, oil, and gas. Also available in angle type, the valve has improved packing, a cylindrical disc holder, a renewable asbestos disc, and a newly designed hand wheel. Information is available. **Item 177**

PORTABLE CONTACT PYROMETER. Page 148. A portable contact pyrometer will give temperature readings instantly of any surface, metallic or non-metallic, flat, curved, stationary, or revolving. For checking the temperature of steam traps, motors, and bearings, eight standard F-scale ranges are available up to 1200 deg. Details of the pyrometers are contained in a bulletin. ----------**Item 178**

PACKAGED AIR CONDITIONERS. Page 149. Packaged air conditioners are available in 2, 3, and 5-ton capacities, water or air-cooled models, for residential and commercial installations. The units have selective manual humidity control, built-in plenum, and 4-way adjustable top air discharge. Catalog and prices are available. ----------**Item 179**

AIR CONDITIONING SYSTEMS. Page 150. This company's air conditioning systems are being installed in a wide variety of Florida clubs, motor hotels, shopping centers, and stations. The systems have advantages to meet any requirement. Catalogs are available. ----------**Item 180**

DRAFT CONTROLS. Page 151. Draft controls for coal and oil-fired heating plants are heavy-duty, commercial models in 28- and 32-in. sizes. They are also available in 6- to 24-in. sizes for domestic and commercial installations. Controls for gas and gas-oil fired heating plants are also made in sizes 8- through 32-in. ---------**Item 181**

Use this digest to locate and refer to items and advertisements appearing in this issue, then fill out and mail the prepaid postcard to request further information.

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AND PRODUCT INFORMATION SERVICE

FIRE PROTECTION EQUIPMENT. Page 152-153. A line of interior fire protection equipment is offered by this company from components to standard cabinets and complete systems to meet fire regulations, insurance standards, and practical needs. A file with standard and alternate specifications for major items is available. **Item 182**

AUTOMATIC BOILER. Page 154. An automatic boiler can be opened for cleaning or inspection by one man in less than one-half hour, for it has hinged doors at both ends. Fully automatic, the boiler is used for hot water and high or low pressure steam applications. Units range from 20 to 500 hp and can be gas, or oil, or combination fired. Catalog and name of nearest distributor are available. ---- **Item 183**

DUAL PURPOSE PUMP. Page 155. In the summer, this pump disposes of the condensate from air conditioner evaporators, and, in the winter, it returns steam condensate to heating plants. Available in capacities from 500 to 10,000 sq ft EDR and pressures from 10 to 30 psi, the pump has a 21-in. diameter, cast iron receiver. Bulletin is available. ---- **Item 184**

MOISTURE CONTENT CONTROL. Page 156. This air conditioning method dries air directly by using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and saves the refrigeration used to condense moisture. It also makes re-heat unnecessary in most cases. Bulletins are available. ---- **Item 185**

UNIT HEATER. Page 157. A 4-way unit heater with a clover leaf pattern of air diffusion is made by this company for steam or hot water in eight sizes from 55,000 to 600,000 Btu per hr. A heat diffuser is also made in sizes from 80,000 to 1,620,000 Btu per hr for floor mounting or vertical or horizontal suspension. Information is available. ---- **Item 186**

AIR DIFFUSERS. Page 158. Air diffusers with diffusing vanes provide air patterns unlimited without blank-off. The diffusers are made with square and rectangular outlet design. The company's engineering staff and laboratory resources are available. ---- **Item 187**

WATER SCALE CONTROL. Page 158. A unit that provides a controlled electrical treatment is made by this company to prevent hard scale formation through a physical change only. No chemicals are needed, and the unit disintegrates existing scale gradually. Bulletin is available. **Item 188**

AIR VELOCITY METER. Page 158. An air meter is made by this manufacturer for checking velocities from 400 to 10,000 fpm and static pressures from 0 to 10 in. of water. The meter kit includes a manometer, 18-in. stainless steel pitot tube, magnetic holding clips, and necessary fittings and tubings. Literature and prices are available. ---- **Item 189**

AIR COOLING EQUIPMENT. Page 159. Air-cooled condensers for inside or outside installations and a line of air cooling coils from 2- to 15-ton capacities are available from this manufacturer. Four-row coils are made for residential jobs and 6-row coils for commercial jobs. Engineering service and details are available. ... **Item 190**

VIBRATION CONTROL. Page 159. Vibration and noise control units made by this company permit the installation of heavy boilers, compressors, and fans on roofs without transmitted vibration to floors below. A booklet on upper floor installations and a bulletin on vibration control specifications for air conditioning equipment are available. ---- **Item 191**

HEATING EQUIPMENT. Page 161. Heat exchangers for the process industries, heating and power boilers, packed and packless expansion joints, pipe line accessories, pipe, and water and oil heaters are among the various items of equipment offered by this manufacturer. Information is available. ---- **Item 192**

REFRIGERANT INDICATORS. Page 161. Refrigerant indicators are made by this company in sizes $\frac{1}{4}$ or $\frac{3}{8}$ in. for small air conditioners or refrigerators and in sizes to $1\frac{5}{8}$ in. for large size commercial installations. The indicators have a pyrex glass window and are guaranteed to 500 psi. Catalog is available. ---- **Item 193**

CONDENSATE WATER REMOVER. Page 162. An automatic unit will remove hot or cold condensate fluids from the receiver tank and pump it to an outside drain or back into the equipment. It can be installed with air conditioning equipment and has a centrifugal pump delivery of $4\frac{1}{2}$ gpm. It measures $5\frac{1}{8}$ in. wide, 10 in. long, and $11\frac{3}{4}$ in. high. ---- **Item 194**

GAS OR OIL BURNERS. Page 162. These gas or oil burners combine low installation and maintenance costs with added years of dependable service. Information is available. ---- **Item 195**

CENTRIFUGAL VENTILATOR. Page 162. An aluminum, belt-drive centrifugal ventilator is manufactured by this company in sizes from 1000 to 16,500 cfm. Direct drive models are also available from 7- to 30-in. sizes. Catalog is available. **Item 196**

OIL UNIT HEATERS. Page 163. Three of this company's oil-fired unit heaters replace six heaters in an auto repair shop because they require no boilers, pipes, valves, or fittings. The heaters are factory wired and assembled. Catalog is available. ---- **Item 197**

INSULATION ANCHORS. Page 163. Surface anchors are made by this company to support block, board, or blanket types of insulation. The anchors consist of perforated metal plates 2 x 2 in. or $2\frac{3}{4}$ x $2\frac{3}{4}$ in. to the center of which is welded a spindle, prong, nail, bolt, or threaded stud. Technical bulletin with specification data is available. ---- **Item 198**

AIR FILTERS. Page 163. The line of air filters offered by this manufacturer includes: a viscous type, permanent and cleanable, in 1- and 2-in. thicknesses for low velocity systems; one that operates at 300 to 500 fpm in 2- and 4-in. thicknesses and a permanent, cleanable grease filter in 2-in. thickness for range canopies and kitchens. Bulletins are available. **Item 199**

LINE OF AIR DIFFUSERS. Page 164. Air diffusers for every application in this manufacturer's line include: cooling, cooling and heating, supply and return, half-round, rectangular, and square. The diffusers are adjustable, for air volume and diffusion pattern. Air diffuser catalog is available. ---- **Item 200**

GAS-OIL BURNERS. Page 165. Seven models of gas-oil burners are made with capacities from 100,000 to 4,600,000 Btu per hr on gas and from 1 to 33 gph on oil for boilers from 2 to 100 hp. The burners can be automatically or manually switched from gas to oil and have electronic safety controls. Specification sheets and prices are available. ---- **Item 201**

AIR HANDLING FANS. Page 165. This company's line of fans offers units for heating and ventilating, fume, vapor, and dust exhaust, make-up air for ventilation cooling and dehumidifying, electronic air cleaning, and mechanical draft for steam boilers. Application service and information is available. ---- **Item 202**

MULTI-FUNCTION CEILING. Page 166. A ceiling that provides radiant heating, cooling, ventilation, humidity control, noise reduction, and lighting from one integrated unit is offered by this manufacturer. A booklet containing photographs details, and design data is offered. **Item 203**

ENGINEERING ASSIGNMENTS. Page 166. Diversified, original assignments are offered by this company to graduate, heating and ventilating engineers with 4 or more years design experience. Successful applicants will design systems required in chemical product manufacturing. Send complete resume. ---- **Item 204**

FLEXIBLE DUCT CONNECTORS. Page 167. These one-piece, factory-assembled, metal-to-material duct connectors unroll flat. Any type of flexible duct connectors can be fabricated by just measuring and cutting. Available in 25, 50, or 100-ft rolls in 3- or 6-in. widths. Catalog and specification sheet are available. ---- **Item 205**

ELECTRIC HEATERS. Page 167. Electric comfort heaters for low cost space heating are made in a choice of blower, convection, or radiant types with totally enclosed heating elements by this manufacturer. The heaters are also made in portable, mounted, or built-in units from 1_4 to 40 kw with automatic or manual controls. Catalog of the entire line of heaters is available. ---- **Item 206**

DAMPER HARDWARE. Page 167. A kit of damper hardware is offered by this company for making non-binding louver dampers. Less skilled labor is required, for little care is needed and no alignment is necessary afterward. Only the frame and blades must be made. Literature is available. ---- **Item 207**

AIR HANDLING EQUIPMENT. Inside back cover. This company's fans, spray coil units and propeller fans were installed in a new 236-bed hospital. The company builds air handling and conditioning equipment exclusively. Assistance on air handling requirements is offered. **Item 208**

REFRIGERATION CONTROL. Back cover. A pneumatic step controller for the control of multiple step refrigeration installations is offered by this company with such features as a recycler and time delay and either manual or automatic sequence changers. A choice of 4, 6, 8, and 12-switch units is available. Bulletin is available. ---- **Item 209**

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LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Function of Drainage Basins

A NECESSARY design consideration for every new construction project is the system of storm water piping and appurtenances that will receive and conduct the storm water to suitable points of disposal. This system must be designed to handle the roof water as well as the water that falls on the paved and unpaved areas, and ground surfaces. For a project consisting of many thousand square feet of roof and paved surfaces, the amount of water to be handled reaches tremendous proportions.

Rainfall Intensity

The amount of rain that will fall on a given area in a prescribed time can be calculated by means of rainfall data tables compiled by the United States Department Of Agriculture. These tables represent the amount of rain that has fallen in a given area over the past 2, 5, 10, 15, 25, 50, and 100-year periods. Such data have been further simplified to reflect the intensity of rainfall in inches during 10 or 15 minutes or other period of minutes. This same type of information is often available in the local plumbing code or can be obtained from local plumbing officials in the area where the project is to be erected.

Rainfall Disposal

After the expected quantity of water to be handled has been determined, it is then necessary to consider the proper means of disposal. If storm water sewer facilities are available in the street, the problem is somewhat simplified since it is only necessary to check the capacity of the existing street sewer to see if it can receive the additional storm water load. The same applies to an existing, combined sanitary and storm sewer. If neither of these is available, it becomes necessary to discharge the water into a nearby brook, lake or any natural body of water.

If the site area is so located that none of these natural discharge means are at hand, the storm water will have to be discharged elsewhere. When this condition is encountered, dry wells* are usually employed. Dry wells are perforated concrete structures of a predetermined capacity into which the rain water is conducted. Sufficient dry wells of proper capacity are included to handle the total rain water that will accumulate on the site. The dry wells serve their purpose by receiving and holding the rainfall which then drains into the earth as fast as the percolation rate of the soil will allow.

When the square feet of roof and paved area on a site is so extensive that dry wells alone will not suffice, then other means of disposal must be considered. Roof and paved areas constitute the biggest rain water load to be handled. The ground surface will absorb a certain per cent of the water and therefore it does not present the same problem as non-porous surfaces. However, even the ground surfaces must be drained by means of catch basins. Thus if the site is level or slightly depressed, flooding of the area will result during a heavy storm. To avoid this occurence, attention is focused on drainage basins to receive and dispose of the storm water.

Drainage Basins

A drainage basin, or recharge basin as it is sometimes called, is nothing more than a hole or depression dug into the earth on the site at a lower elevation into which the storm water from the buildings, paved areas and general site will flow. The function of a drainage basin is to receive and retain this water, but to permit it to drain into the earth as fast as the percolation rate of the soil will allow. The word recharge originated with the ability of this pit to replenish ground water streams. Ground water in many areas is a primary source of water supply. Paved areas and increased water consumption deplete such supplies. When the water is permitted to drain back into the earth, the ground water certainly benefits. Recharge basins, however, have a specific application in certain parts of the country. The function of the basin in this article is that of a drainage basin only and a typical application is shown in Fig. 1.

In this figure, it will be noted that the site used for illustrative purposes is that of a good sized manufacturing plant, consisting of a main building, numerous manufacturing buildings as well as a boiler house, parking areas, and grounds around the buildings. The drainage basin is located at the corner of the property, which happens to be best suited for the grade of the property.

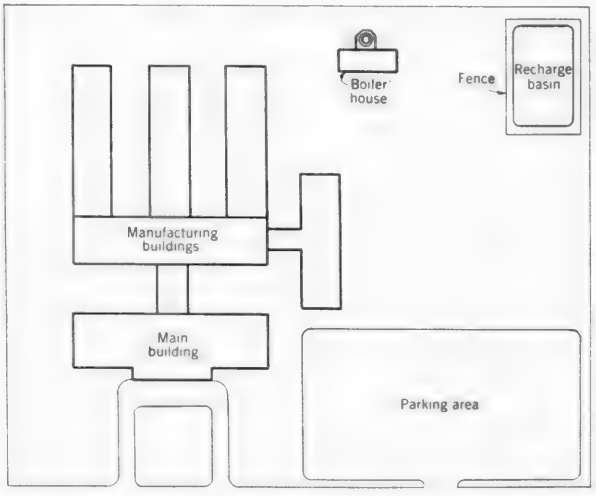


Fig. 1. Typical application of drainage basin.

*See article Location and Construction of Dry Wells, HEATING AND VENTILATING, August, 1954.

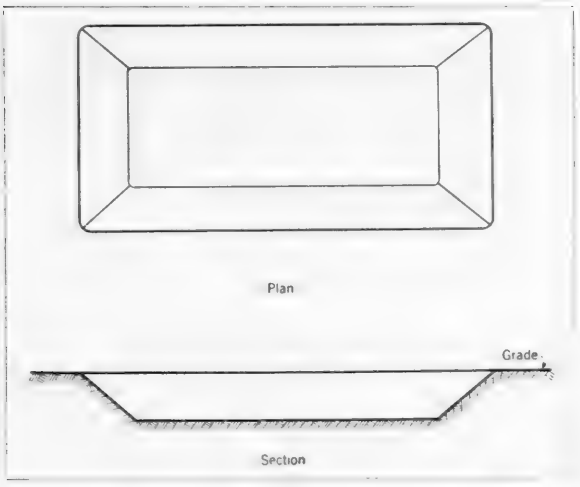


Fig. 2. Typical section of drainage basin.

All the rain falling on the buildings, paved areas and general surface area is intercepted by proper drains and conducted to the drainage basin. Manholes for cleanout purposes should be placed at suitable intervals along the storm water sewer, particularly at the intersection of two or more drainage lines as well as at proper spacing along the storm water line to ensure adequate and convenient clearing of the drainage lines.

A fence is shown around the drainage basin to prevent persons from falling in. This provision is especially important as protection for children.

Construction

A drainage basin is usually constructed or formed by means of a bulldozer. The surplus earth can be used for fill in grading the site. A typical section of this basin is shown in Fig. 2 and shows how the sides of the basin are sloped at an angle that best suits the depth of the basin and the stability of the soil. This prevents the sides of the basin from sliding into the basin. Sometimes, crushed stone is placed at the bottom of the basin and partly up the sides to facilitate drainage. However, the addition of crushed stone depends entirely upon the particular design.

The size of any drainage basin is related to the amount of water to be retained. The percolation rate of the soil is also an important factor. Should percolation tests taken of the soil indicate a sluggish drainage rate, it is then advisable to increase the size of the drainage basin to accommodate an extra quantity of water in the event of an extended rainfall.

Outfall Structures

Since the underground storm water lines will discharge into the drainage basin, it is necessary to erect some sort of a structure that will prevent the flowing water from washing away the earth at the point of its contact in the basin. There are many different types of structures that can be used for this purpose. A typical outfall structure is detailed in Fig. 3.

The outfall structure, Fig. 3, is constructed entirely of reinforced concrete and allows the water to splash on the concrete pad and spread out evenly along the bottom of the basin. This prevents the damage to the bottom and sides of the basin that could otherwise be caused by the water. The overall size of the structure is determined by the diameter of the drainage line.

Maintenance of a Drainage Basin

Like every other appurtenance, a drainage basin must be maintained periodically to obtain the greatest efficiency in its use. Since water will more or less always be contained in the basin, attention must be given to appropriate mosquito control. Proper care of course will prevent the breeding of mosquitoes

Silt and other fine foreign matter will clog the surface layer of the depression, which in time prolongs the time required for the water to seep into the earth. To rectify this condition, it is often necessary to scrape the surface of the basin to expose the porous earth again. This is generally done every two or three years, depending upon the intensity of such clogging impurities. This task is generally performed during the dry seasons of the year.

Benefits

In addition to serving the drainage needs of the property, drainage basins very often can be used to further advantage in beautifying the property itself. By developing the area immediately surrounding the basin, it is possible to transform a necessary drainage facility into a garden spot. Trees, flowers, shrubs, walkways and benches certainly enhance the area and provide a spot of relaxation for employees.

Moreover, the water contained in the basin offers an excellent secondary reserve for fire protection purposes. In addition, by means of pumps and an adequate strainer on the intake line, the water can be used to sprinkle the lawn and flowers. There are perhaps many other uses for which this water can be employed. These benefits certainly compensate for any loss of property value or valuable space that the owner normally hesitates to relinquish.

Other Applications

Drainage basins need not only be used for a private building enterprise but can be used for communities, small home developments, schools, hospitals or other groups of buildings.

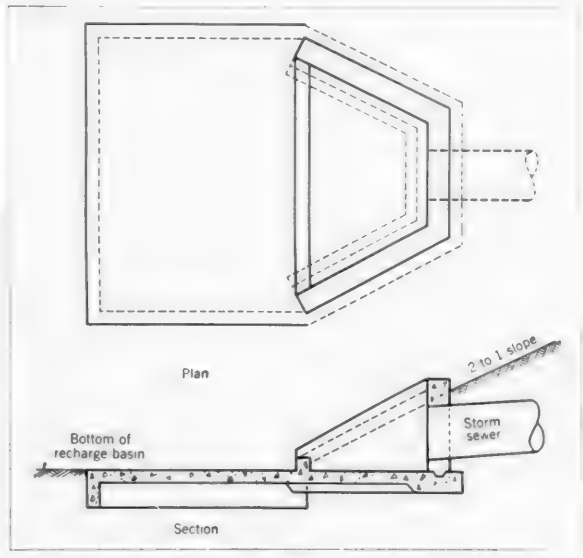


Fig. 3. Typical outfall structure.

Why Britain Froze

Our unrepentant London Correspondent has the effrontery to indulge in history in relation to Europe's winter freeze. He defends the status quo and reports on a new research venture.

"CHAPTER LXII—A BAD THING"

"America was thus clearly top nation, and History came to a . (full stop)"

So ends the most memorable book of English History, first published in 1930. Your Correspondent was present on the noteworthy occasion before World War II when the Oxford Union Society, by a substantial majority, resolved "That this House will learn its history from *1066 and All That*", and has ever since used this slim volume as a valuable work of reference. There have been a certain number of Battles, Banquets, Commencements, Graduations, Degree-days, Coronations, Elections, Heated Conferences, Ventilations and Airy Conditions in the last 25 years, but nothing to alter the chapter quoted above. Even the description of the 1914-18 war would do tolerably well for the last one:

> "The War lasted three years or the duration, the Americans being 100% victorious. The Russians rendered great assistance to the American cause by lending their memorable steam-roller and by passing silently through England one Sunday morning before breakfast with snow on their boots. The Americans were also assisted by the Australians (AZTECS) and some Canadians, and 51 Highlanders."

This book, written after much research (into schoolboy howlers) by two English schoolmasters, ought to be (if it isn't) required reading in all American senior schools. There can be no easier way of studying the subject. The book contains, for example, only two dates. Originally there were four, but at the last moment two of them were omitted because the authors found, by diligent enquiry among the highly educated persons attending an Eton *v* Harrow ball game, that they were *not memorable*.

Magna Carta and The Great Freeze

It is commonly said that British plumbing dates from the time of Magna Carta. The world press of the last few weeks has been full of stories of snow-blocked roads, burst pipes, closed schools, ruined crops, and ladies unable to take a bath for several days, and all because the thermometer dipped a few degrees below 32. Is this true? Well, frankly, yes. But why on earth. . . . ?

Perhaps we had better start at the beginning and have a look at Magna Carta. This is of particular relevance in Election Year, and the best summary of it is to be found in the aforementioned authoritative work. It was, readers will remember, signed by King John, who was such a *Bad King* that it is unlikely there will ever be another with this name on the British throne. Magna Charter was an invention of the Barons and it said:

> "1. That no one was to be put to death, save for some reason—(except the Common People).
> 2. That everyone should be free—(except the Common People).
> 3. That everything should be of the same weight and measure throughout the Realm—(except the Common People).
> 4. That no person should be fined to his utter ruin (except through income-tax).
> 5. That the Barons should not be tried except by a special jury of other Barons who would understand. (This was abolished by Parliament 730 years later).
> Magna Charter was therefore the chief cause of Democracy in England, and thus a Good Thing for everyone (except the Common People)."

After signing this document, John finally demonstrated his utter incompetence by losing the Crown Jewels and all his clothes in the wash. And thus we get the first reference to plumbing. However, your Correspondent thought it was the wash he lost the jewels in, that little bay on England's East coast between Boston and King's Lynn, which is situated on about the latitude of Edmonton, Alberta.

Now, a friend of your Correspondent recently had occasion to go to King's Lynn. . . . "And when I got out of the car the man I was going there to see said 'Do you know what the temperature is?' 'No'. 'It's six, SIX'. 'No, not really'. 'Yes it is, come and look'. And sure enough, that's what it was, and at eleven o'clock in the morning too".

Even in central London, which is so surrounded by houses and factories for miles in every direction that the air temperature on cold days is usually up to five degrees warmer than in the suburbs, the thermometer remained below 32 for several days on end. Stand pipes were erected in the streets to which people could bring buckets and cans, and burst pipes everywhere caused such a waste of water that some water supply companies became seriously worried about their reserves. The plumbing of whole new housing estates was put out of action. It looks like simple incompetence, and in part it is, but mainly it's a question of economics.

The first part of Britain that becomes visible after crossing the Atlantic is Cornwall, and Mevagissey on the South coast was your Correspondent's home village for many years. There was main drainage but no mains water. The townsfolk filled their cans and swapped news daily at the village pump. Our house, 100 ft up the cliff, obtained water partly by collecting rain off the flat roof, partly from our own well, and partly from a stream half a mile away which was piped to a small group of houses. This water flowed into a tank which stood *on* the roof, and once, once only in fifteen years, your Correspondent can vaguely remember having to go on the roof to break the layer of ice and free the ball-cock. That year it was considered worth while to wrap the exposed pipes with sacking or straw, and it was probably the same year that there was a fall of snow. It lay on the ground for half an hour before vanishing.

The neighbourhood of London is normally a little colder than that, and the pipes run inside, rather than outside the houses; this only applies to water supplies, however, drain and waste pipes being (according to most local building regulations) outside because of some antiquated health objection to having drains *under* the house; the result of this is that one slowly dripping faucet blocks the waste pipe solid with ice in a night and puts the bath out of action. Even the inside pipes are commonly run up just inside the outer walls so that the elbow freezes at the roof eaves; doing it otherwise requires thought and a bit more expense. Roofs themselves are rarely lined, and even where householders have been persuaded that it would pay them to insulate, the insulation has usually taken the form of mineral wool or aluminum foil laid on the floor of the roof space; the result of this is that the roof space, in which the water tank stands, is even colder than it was beore! Result: fire brigades called out to extinguish blazing roofs set on fire by owners with blowlamps trying to thaw their pipes.

And did your worthy and knowledgeable Correspondent escape? Well, no. The plumbing, complicated as it is in this old house with its 16 chimneys which has seen many changes in its 80 years of life, was perfectly satisfactory. But some years ago it was necessary to replace the decaying Welsh slates, and interlocking tiles were used instead. The roof could have been lined under the tiles, but the weather was wet, large areas of stripped roof might have caused wet ceilings, and it would have cost the equivalent of an extra 350 dollars, which were not available. The tiles do not fit as closely as the slates, and the roof tank froze the following year. Some insulation around it and a low-temperature electric heater for cold nights solved that one at an equivalent capital and running cost over six years of about 20 dollars. But because of difficulty of access a short length of pipe was left uncovered and for two days this year two bathrooms out of three were out of action—an inconvenience that scarcely justifies the effort needed to ensure that it doesn't happen again in 1976. Of course, if it appears that we are in for some colder winters, then one of the growing members of the family, old enough to understand what is wanted yet still small enough to squeeze into the required position, will be sent into the roof space to do the necessary! Like nearly every question, this question of Britain being apparently knocked out by an unexpected descent of the thermometer into the low twenties boils down merely to a question of economics.

Snow Ploughs, Cabbages and Coal Fires

This economic aspect applies very much to the problem of keeping the roads open. If efficient snowploughs are going to be needed every winter, then a community readily supplies itself with one and keeps it ready for use. But some of the districts in England that needed a snowplough recently would probably not have been able to find it even if one had been prudently acquired many years ago. One can imagine a scene like this in the municipal offices:

Assistant Clerk: "I've got Mrs. Sykes of Wadbury House on the phone. Says she's got to get her car out to go to a meeting to-morrow and wants to know when we're going to clear the road. Says Council's got a snowplough, and why don't we use it? Did you ever 'ear tell of a snowplough, George?"

George: "No, I never. Tell her we'll do what we can, and ring the Town Clerk."

Assistant Clerk: "Okay, Mrs. Sykes, we'll look into it." (Rings through on intercom.) "Mr. Granville, Highways here. Do you know if we've got a snowplough? . . . Oh, Okay. (Replaces phone). George, he says he's only been here five years. They never used them in his town and he wouldn't recognize one if he saw it. Says to ask the Borough Treasurer, 'cos if we've got one he'll be paying someone to look after it."

Assistant Clerk (an hour later). "Well, George, I've found that snowplough. Seems it's kept at the Park Garages and they say if we mean that old bit of junk at the back of their repair shop it's jammed in behind a couple of broken down buses and they may be able to get it out day after to-morrow."

Several sensitive crops in parts of Europe where they never have severe frosts have been damaged; frost has got into potato clamps in Britain, and acres of green vegetables have been spoilt. The seed catalogues offer a kind of kale which is guaranteed frost-proof, but it's not very attractive eating. Should one plant some of this every year just because one year in twenty most other greens will be ruined? One has to be a fanatical lover of English cabbage to do that when the shops are full of fresh-frozen peas. Less than a week after the disappearance of snow the apricot and peach buds are breaking normally in this garden.

An acquaintance who was born in Poland has just bought an English house and complained the open coal fire would not heat it. He will throw it out and put in efficient closed stoves. He's welcome. A quick calculation showed that with an ordinary open fire drawing 9000 cu ft of air an hour from the outside *through* the room (the usual arrangement) he'd need to burn a hodful of coal a day before he got any useful heat. But your Correspondent's living-room fire, which draws its air under the floor and is capable of an enormous rate of heat output when needed, warmed the room very nicely and cheerfully. It all depends what one is used to.

Brighter Future

The Institution of Heating and Ventilating Engineers has taken the lead in the formation of a co-operative "Heating and Ventilating Research Council." The inaugural meeting was held on December 29th and financial support from some 200 organizations in the country has been forthcoming. The contracting side of the industry is well represented, there being support from firms employing over 70% of those engaged in this work. Manufacturers, except those concerned with automatic controls, seem less interested. The aim is to undertake co-operative research and a start has already been made in a small way by leasing space at the Industrial and Domestic Engineering Laboratories of the British Coal Utilisation Research Association, and by appointing the Director of these laboratories, Mr. J. S. Hales, as part-time Director of the new Council. The choice is a good one. Besides being responsible for the B.C.U.R.A. research which has from time to time been reported in this column, Mr. Hales has invented (and used in building his own house) a complete heating and plumbing unit in which *all* the pipes are carried up and down in the middle of the house. He has even persuaded one or two local authorities to allow houses to be built that way.

Enquiries about the Research Council and its work may be addressed to the Acting Secretary, Mr. J. Duncan Ferguson, Abbott's Chambers, 202, Bishopsgate, London, E.C. 2.

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

This Month's Problem

Although I have seen dry wells installed about a home to handle rain water from the roof, I would like information on the proper design of a dry well for an industrial plant, how to determine the size of the well, and what maintenance may be necessary.

THERE is one problem that must be considered in the design of industrial plants that does not receive the attention to which it is entitled. How should a dry well be designed to take care of the rain water from the building roof. Since many plants cover an extensive area, there can be considerable rain water to handle.

The problem in full that is discussed in this issue is presented in the box on this page. Should you have comments that you would like to add to the following discussion or if you have a problem that you would like to see treated in this department, please write the editor.

Discussion of the Problem

The details of a dry well to serve an industrial plant are shown in Fig. 1. Aside from the construction details, it is important that the well be located in ground that slopes away from the building. If the grade is level or slightly depressed, then the grade over the dry well should be raised and sloped away to prevent surface water from accumulating and seeping into the dry well. This seepage will reduce the effective capacity and may cause the dry well to fail in its purpose.

The size of a proposed dry well is governed by:

1. Rate of rainfall prevalent in the area.
2. Total roof area to be drained.

The rate of rainfall prevalent in the area, based on the intensity of rainfall in inches per hour, and the time of concentration in minutes, will determine the required size of dry well for a given roof area. The heaviest rainfall will occur during a fractional part of a storm, and the dry well is usually sized for this concentrated flow. Tables of the records of rainfall for any given area may be obtained at local U. S. Weather Bureau stations. Since the rainfall rates given in the tables are based on the greatest intensity over a number of years, it is safe to assume that the dry well will be of more than ample size.

Once the rainfall rate has been decided upon, it must

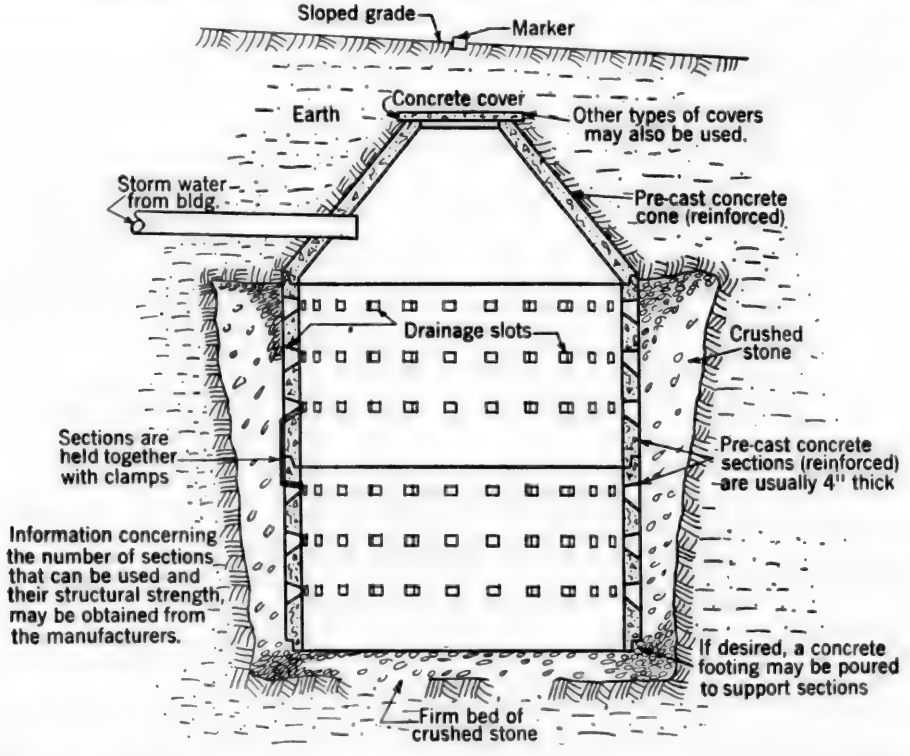

Sloped grade
Marker
Earth
Concrete cover
Other types of covers may also be used.
Storm water from bldg.
Pre-cast concrete cone (reinforced)
Drainage slots
Crushed stone
Sections are held together with clamps
Pre-cast concrete sections (reinforced) are usually 4" thick
Information concerning the number of sections that can be used and their structural strength, may be obtained from the manufacturers.
If desired, a concrete footing may be poured to support sections
Firm bed of crushed stone

Fig. 1. Installation details of a dry well constructed of pre-cast concrete sections.

be applied to the total roof area to be drained. For very large roofs, several dry wells may be required. If the flow is such that an abnormally sized well would be required to handle such a flow, then an additional dry well should be installed.

A great deal will depend upon the porosity of the soil that surrounds the well. If the drainage rate is slow because of the tightness of the soil, then it will be necessary to increase the size of the well somewhat to take care of such a condition. When the percolation rate of the soil is not known, then it is advisable to make a percolation test. If the soil is so tight that drainage is not possible, then dry wells cannot be used and other means for rain water disposal must be considered.

Since a dry well will be in service for a good number of years, one must realize that soot and other fine material on the roof will be washed down during a storm to gradually build up a layer of fine material on the outside wall of the well. If the space around the well is filled with crushed stone this action will be prevented as an opportunity will be given for the fine matter to disperse.

When the drainage capacity of a dry well that has been in service for some time loses its drainage capacity, it is reasonable to assume that the soil immediately surrounding the dry well has become clogged. To correct this, it is necessary to dig out the earth surrounding the well and to replace it with fresh sand or gravel, or crushed stone.

Louis Blendermann

Erie, Pa.

Dry wells for industrial plants can be similar to those for private houses except that they must be greater in number and/or larger in size. The area being drained into such dry wells should be carefully calculated using the proper factors for the anticipated rainfall in that locality and for the types of surfaces being drained. Many designers have their own pet ideas regarding the sizing of dry wells. However, the holding capacity of a dry well together with its leaching capacity must be more than sufficient to provide for any normally anticipated rainfalls. Leaching capacity calculations must be carefully based on the tested percolation rate of the soil at the proposed location of the dry well. Only generalities and principles can be given for sizing as it is impossible to give in this limited space, exact quantities or factors for sizing, due to the variable rainfall rates in different sections of the country, and to the variation in the percoating rates characteristic of different soil conditions.

A common size for dry wells is approximately 8 ft in outside diameter. However, they can be built in larger diameters for installations where holding to this diameter would require an unreasonably large number of units. Dry wells should be spaced as far apart as possible, with a minimum spacing, center to center, of 10 ft plus the diameter of the dry well. The bottoms of the dry wells must be kept at least 2 ft above ground water level.

Dry wells are usually constructed of concrete cesspool blocks or precast concrete units, both of which have specially designed holes to provide leaching of the water inside into the soil, while at the same time preventing the outside soil materials from working back into the dry well. They can also be built with regular concrete building blocks laid with the holes horizontal or even with field stone laid up without mortar. However, the first mentioned construction is preferred. Tops are most usually reinforced concrete slabs, but in deep installations can be reinforced concrete cones or corbelled brick with mortar joints. Dy wells should be provided with an access manhole in the top so that sediment collecting in the bottom can be removed if it collects in quantity. Dry wells should be back-filled on the outside with a 6 in. width of ¾ to 1½ in. gravel, below a point 6 in. above the inlet level. A similar layer of gravel should be placed in the bottom, inside the wall fittings. The walls should be set on concrete footings for stability.

The leaching capacity of the dry well can be figured on the basis of the outside area of the gravel surrounding the wall below the inlet and varied by increasing the depth. It is usually best not to include the bottom area as this becomes silted in time and thus reduces the leaching capacity below that required.

Dry wells carefully and generously calculated as mentioned, and properly constructed should do a satisfactory job of disposing rain water into the ground, provided soil conditions on the site are of such nature that the ground will readily accept the water. Properly sized and constructed dry wells should function with little or no maintenance except for the possible occasional need for removing silt accumulated in the bottom of the well. Even this should be a minimum, if the site drainage inlets used are of the catch basin type with sediment traps in the bottom.

James C. Church
Associate and Head of Sanitary Department
Syska & Hennessy, Inc.

New York, N. Y.

Behavior of Vertical Jets of Heated Air

In a paper, Characteristics of Downward Jets From A Vertical Discharge Unit Heater, Professors S. M. Yen and Linn Helander of Kansas State College and L. B. Knee an instructor at the same college, give data describing the behavior of jets of heated air projected vertically downward from a unit-heater into space with remote boundaries. The paper was presented at the Annual Meeting of ASHAE.

The data, used with regard for the design of equipment and the test conditions employed, may serve as guidance and reference for designers and investigators.

The paper presents the following experimentally determined data: (1) velocities and temperatures along the vertical axis of the jet discharged from the heater, (2) velocities and temperatures in the region of fully developed flow, and (3) temperatures in the space surrounding the jet.

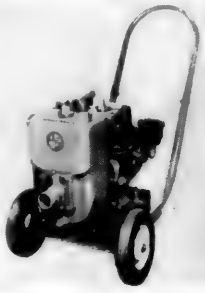
This exploratory study, according to the authors, has served the purpose of providing useful information, but they believe future research should be devoted to jets wherein the factors to be investigated can be isolated and controlled.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on page 101 for securing additional information on new equipment and materials described in this department.

Line of Self-Priming Pumps

A line of self-priming pumps is being marketed by Bell & Gossett Co., Morton Grove, Ill.



A motor driven self-priming pump, called Little Gem, is designed for the use of plumbing and heating contractors. Equipped with a ¼-hp motor, it is capable of producing capacities to 23 gpm and heads to 50 ft. It is also available with an explosion-proof motor.

Two gasoline engine driven, self-priming pumps (illustrated) are also included in the line. The self-contained pumping units will operate for more than two hours on a full tank of gasoline. They are capable of producing capacities up to 135 gpm and heads up to 100 ft. The complete line of self-priming pumps is available through most wholesalers of plumbing and heating equipment.

More information? Circle Item 1 on postcard, page 101.

Hermetic Refrigerating Machine

An hermetic, centrifugal, refrigerating machine that is controlled by pushbuttons is introduced by Carrier Corp., Syracuse, N. Y.

In the new hermetic machine, the compressor and electric motor drive are united in a single casing. The machine requires no foundation and can be located on the upper floors or roof of a building.

It will be initially available in thirty different capacities ranging from 100 to 325 tons, a ton of capacity representing the cooling effect which would be produced by a similar amount of ice melting over a 24-hour period. Multiple units can be used where larger capacities are required.

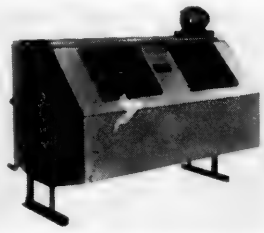
The machine is supplied as an integrated unit, including the pushbutton start-stop mechanism and electronic controls for automatic operation. It needs only to be connected to the air conditioning system and source of electrical power. Once it has been put into operation by the start-stop button, it adjusts automatically to the refrigeration load, maintaining the required temperature.

An assembly of vanes regulates the flow of refrigerant gas into the two rotors of the compressor. Hydraulically operated under electronic control, the vanes adjust the cooling output and remain closed until the motor has reached normal speed.

More information? Circle Item 2 on postcard, page 101.

Blower Condensers

The operation of air conditioning and refrigeration systems without the use of water is possible with a new line of BC blower condensers introduced by Bush Mfg. Co., West Hartford, Conn.



Available in capacities up to 20 tons, the units have a low noise level and are equipped with the company's patented Inner-Fin coil construction. They have steel cases with a rust-resistant finish.

The blower condensers are available arranged with either blower fan (illustrated), for indoor installation or propeller fan as desired.

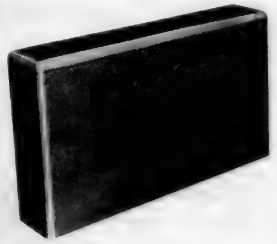
Bulletin No. 881 contains complete specifications.

More information? Circle Item 3 on postcard, page 101.

Room Air Conditioner

A room air conditioner, called the Induction UniTrane, for high pressure air conditioning installations is introduced by The Trane Co., La Crosse, Wis.

Designed specifically for perimeter zone cooling and heating in an induction type air conditioning system, the unit has a tandem arrangement of jets in the nozzle plate which provide multi-stage induction of secondary air. The unit filters both primary and secondary air before it is uniformly diffused to conditioned areas.



The unit is available in both a vertical cabinet and vertical concealed model. The latter can be installed in an enclosure occupying 7 in. of floor space depth, while the cabinet model requires one more inch of floor space. Both units are 22¾ in. high.

There are eight basic capacity arrangements possible. Sized for 30 to 120 cfm of primary air, the units can be specified with standard or over-size nozzles to eject the primary air and induce secondary air. The nozzles are made of smooth plastic, contoured to keep unit noise level at a minimum and to help prevent the collection of dust or dirt.

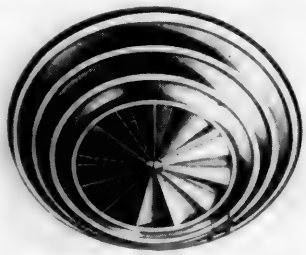
The units are equipped with a reversible heating and cooling coil. The design of coil circuits is such that rated capacities are based on constant gpm, regardless of unit size. Units have one nominal water flow rate. Pressure drops across risers are equal at nominal capacities. This means units can be selected without balancing individual unit piping circuits.

Temperature controls allow room occupants to select their own temperature conditions. The controls are located immediately under flush access doors in the top panel of the unit.

More information? Circle Item 4 on postcard, page 101.

Diffuser Is Adjustable

A new ceiling diffuser, designated Model BP Venturi-Flo, is available from Barber-Colman Co., Rockford, Ill. It features a full variation of air patterns from horizontal to vertical and is capable of driving hot air to the floor from mounting heights up to 50 ft with temperature differentials as high as 40 deg F. Greater projection of warm air is possible with lower temperature differentials.



Because it is adjustable and capable of long vertical throws, the diffuser is suitable for use in heating, ventilating, and air conditioning applications in manufacturing areas, gymnasiums, field houses, auditoriums, and similar structures.

Adjustments can be made from the floor to provide air patterns ranging from vertical to horizontal. When adjustments from the floor are not practical, an adaptor unit can be furnished to permit adjustments through the duct from the crawl space above the ceiling.

Catalog F7792 contains the specifications of the diffuser.

More information? Circle Item 5 on postcard, page 101.

Bearings Are Cushioned

A line of rubber-cushioned, ball bearing units is being manufactured by the Fafnir Bearing Co., New Britain, Conn., to replace ordinary sleeve bearings in home and commercial heating and air conditioning equipment where quiet operation is of primary importance. Through a combination of processed ball bearings encased in rubber, the units reduce the sound of moving parts in such equipment to a minimum.

Features of the units include: an extended inner ring for greater shaft support; the company's self-locking collar for easy assembly; patented, removable Plya-Seals that keep the lubricant in and contaminants out; and pre-lubrication with factory filtered grease.

The line includes pillow block units (RPB Type, illustrated) and rubber cylindrical cartridges (RCR and RCSM Types). The RCR Type fits popular brackets using sleeve bearings.

More information? Circle Item 6 on postcard, page 101.

Reverse Acting Valve Unit

A valve power unit for controlling gas pressure build-ups in supply lines has been developed by Eclipse Fuel Engineering Co., Rockford, Ill.

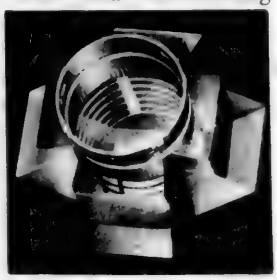
Called the Series R, the reverse acting, power unit, combined with the company's safety shutoff valve will shut off the gas supply to a burner if the incoming pressure builds up beyond a safe point.

The reverse acting power units may be applied to all of the company's Tite valves, replacing the standard pressure operator. It is also possible to combine reverse acting power units with standard power units to provide protection from pressure failure as well as excessive pressure build-up. The units are available in four standard tripping pressures ranging up to 10 psi.

More information? Circle Item 7 on postcard, page 101.

Gas Vent Pipe Opening

A top for external, gas vent pipe openings has been improved to prevent nesting birds and accumulating debris, by William Wallace Co., Belmont, Calif.



The new version of the top includes an interior grille which bars small birds from entering the vent outlet and acts as a filter to prevent twigs, leaves, paper, and other debris from clogging the discharge opening.

By keeping the external outlet free from obstructions, the grille assures optimum vent performance, thus facilitating proper venting throughout the house. It is now incorporated in all of the company's Belmont tops, available in sizes from 3 to 8 in. in diameter.

No change has been made in the fundamental design of the top which features vertical side shields to prevent backdrafts and protect interior vent systems from rain, snow, and ice.

More information? Circle Item 8 on postcard, page 101.

Automatic Relief Valves

A line of automatic, self-closing temperature and pressure relief valves is available from Watts Regulator Co., Lawrence, Mass.

Offered as Series Nos. 140 and 240, the valves are suitable for commercial and industrial installations, as steam discharge capacities up to 1,732,000 Btu per hr are available.

Series No. 140 can be furnished with an extended thermostat where requirements do not allow the valve to be placed as close to the vessel as necessary, or, the valve may be furnished with a short thermostat, as shown, for other requirements. It is available with a 3/4-in. female inlet and a 3/4-in. female outlet or a 1-in. male inlet and a 3/4-in. female outlet.

Series No. 240 has an extended thermostat and is available with a 1-in. female inlet and a 1-in. female outlet or a 1 1/4-in. male inlet with a 1-in. female outlet.

The valves are rated in accordance with ASME and National Board of Boiler and Pressure Vessel Inspectors requirements and bear their symbol. The valves also conform to Type I requirements of military specifications MIL-V-13612-CE.

More information? Circle Item 9 on postcard, page 101.

Steel Stud Insulation

The space between steel studs, joists, open web bar joists, and other beams and trusses can be insulated with the multiple aluminum insulations being made wider by Infra Insulation, Inc., New York, N. Y. Whether the space be 24, 30, 48 or 60 in., or wider, it can be insulated using single units or various combinations. Since the insulation comes in continuous lengths up to 750 ft, one long, continuous barrier to heat and vapor flow can be installed.

An improved technique for installing the insulation to steel studs has been developed for multiple aluminum. The flanges are attached to the framing with small clips, manufactured expressly for the purpose. There is no need for a nailing surface and no necessity for furring, backerboard, or wire mesh.

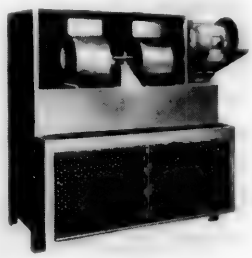
Instructions on the installation of insulation between steel studs as well as under various other conditions are included in a pamphlet published by the manufacturer.

More information? Circle Item 10 on postcard, page 101.

Cabinet Type Conditioners

A line of cabinet type air conditioning units that cool, dehumidify, heat, humidify, and clean the air has been developed by Worthington Corp., Harrison, N. J. The units are designed to distribute air from either a central refrigeration or heating system and will appear on the market in May.

A feature of the line is interchangeable panels that permit any preferred air discharge and air intake. The motor mounting and fan location may be positioned in front, top, or back of the unit. Another feature is the 3½-in. variation in motor base adjustment made possible by a single screw. A locking nut holds the base in the proper position. This enables positioning of the motor for correct belt tension.



Designed for use in stores, shops, apartment buildings, hotels, and large factories, the units can be installed either vertically (Model CV illustrated) or horizontally (Model CH). They consist of three sections—a base section, a fan section, and a coil section with a drip pan. They will be available in ten different sizes, ranging from 1½ to 106 tons capacity, and will offer as many as eighty-one coil combinations for either chilled water or direct expansion application. The units can handle up to 19,200 cfm.

The five smaller sizes will be shipped assembled; the five larger sizes will be shipped in sections according to the customer's specifications.

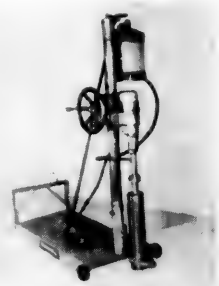
Accessories include cleanable water coils, water spray, steam grid and steam pan humidifiers. All accessories are interchangeable between horizontal and vertical units.

A 52-page bulletin (No. C-1100-B86) telling all about the units will be available.

More information? Circle Item 11 on postcard, page 101.

Portable Concrete Drill

A portable electric drill that ues diamond bits for drilling holes in or extracting test cores from concrete structures is manufactured by Pennsylvania Drilling Co., Pittsburgh, Pa.



Named Penndrill Model E, the tool drills holes from ½ to 6½ in. in diameter either vertically, horizontally, or at an angle, through concrete walls and floors, reinforced concrete, marble, granite, tile, glass and brick.

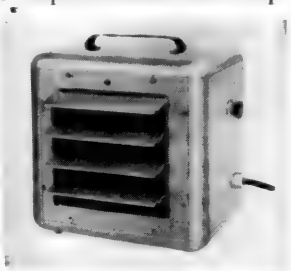
Drilling speeds average from 1 to 3 in. per minute depending upon the degree of hardness of the material being drilled and the amount of steel encountered.

More information? Circle Item 12 on postcard, page 101.

Electric Unit Heaters

A line of electric unit heaters is available from Circle-Air Industries, Brooklyn, N. Y.

A feature called Heat-Saver keeps the heater fan in operation after the thermostat has been satisfied and continues until the fins cool to 210 deg F. The additional heat thus generated is delivered as useful warmed air, rather than wasted at ceiling level. The thermostat is set lower than the degree of heat desired. The additional heat supplied after the thermostat has been satisfied, raises the temperature to the level selected. The fan is inoperative until fins warm up.



Thin, closely spaced aluminum fins provide the air contact with the heating element.

A range of electric unit heaters is available to fit needs from 3000 to 10,000 watts. Models are available for wall thermostat, or with single or double pole, built-in thermostats.

When necessary, the removal of a few screws gives access to all parts for servicing. There is no need to remove the motor or fins for minor adjustments. The sand colored, baked enamel case has no sharp corners and no protruding junction box.

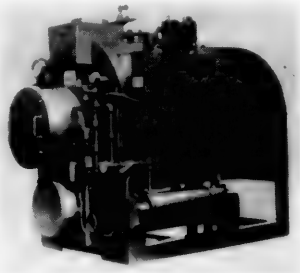
The manufacturer suggests that for large areas, the installation of two or more units will give more economical and efficient heating than one unit of higher capacity. The unit heaters are designed for factories, shops, garages, guard houses, churches, service stations, and cabins.

More information? Circle Item 13 on postcard, page 101.

Boiler for Limited Spaces

A packaged, automatic boiler that handles up to 50 hp requirements, yet is sufficiently small in size to meet conditions where space is limited, is announced by Boiler Engineering & Supply Co., Inc., Phoenixville, Pa.

Named Model N50, the unit is an addition to the company's standard line of 20- to 500-hp Continental automatic boilers and was designed to meet special conditions where a standard boiler of similar capacity cannot be employed. It measures 7 ft 2 in. long, 3 ft 4 in. wide, and 5 ft 2 in. high. A clearance of less than 4 ft from both front and rear doors is all that is required for tube removal.



A packaged or fully assembled unit, the boiler is equipped with a burner, boiler trim, automatic controls, Fiberglas insulation and a metal jacket. It can be furnished to burn light oil, No. 5 oil, or gas. Combination units that burn either gas or No. 5 oil, or lighter, can also be supplied.

The burner is a forced draft type, designed to fire any of the above fuels; and, if desired, a quick changeover can be made from one fuel to another. The burner fires directly into the water-backed furnace, thus eliminating the need of a special refractory, firebox lining.

The boilers are built in accordance with ASME and state codes, are made of flange and firebox quality steels, and are electrically welded. High pressure boilers are X-rayed and stress relieved. Controls include a pressure or temperature switch, a low water cutoff, electronic combustion safety control, fuel solenoid valves, and burner motor starter. The complete unit is test fired before shipment to assure proper operation when service connections are made.

More information? Circle Item 14 on postcard, page 101.

Machine Pulls Pipe

An air powered pipe puller and pusher for installing pipe under pavement is manufactured by Trojan Mfg. Co., Troy, Ohio.

Designed to handle pipe up to 2 in. in diameter without additional dogs, clamps, or wedges, the air powered model is operated by the regulation of a control valve. It keeps pipe continuously moving because it requires no resetting of its grip. It has three pushing speeds for different types of soil and can be changed from a pushing to a pulling position in 30 seconds.

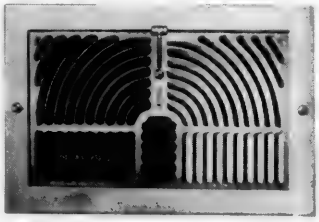
The machine uses a 30-in. push pipe and requires a 5½-ft trench for operation. For lifting in and out of the trench, the air cylinder may be removed from the machine by removing a single pin. If so desired, the machine may also be operated by hand.

Construction features of the machine include steel parts and a gripping dog with individual, interchangeable inserts for each step. The air cylinder, which measures 26 in. long by 4 in. in diameter, is connected to the control valve by means of quick-change air couplings and two 6-ft lengths of rubber hose. The control valve, which regulates the back-and-forth action of the cylinder, is equipped with an oiler and with an outlet for connection to an air compressor.

More information? Circle Item 15 on postcard, page 101.

Perimeter Sidewall Diffuser

A sidewall type, perimeter diffuser has been designed and engineered to provide a fan-shaped air delivery by The Auer Register Co., Cleveland, Ohio. The new diffuser is suitable for use in heating or combination heating and cooling systems.



Known as Fanaire, the diffuser can be installed close to the floor level providing an upward, floor-to-ceiling, fan-shaped air pattern, while up-side-down installation near the ceiling enables ceiling-to-floor coverage. Its design and diffusion pattern makes it adaptable for use as a ceiling outlet.

The diffuser is available in standard 10 x 6-in., 12 x 4-in., and 12 x 6-in. sizes, thereby permitting changeovers from existing units. It is also available in models for baseboard mounting. An additional feature is a built-in damper which provides control for system balancing.

Information and specifications on perimeter diffusers for heating or combination heating and cooling systems are available in the manufacturer's bulletin PR-56.

More information? Circle Item 16 on postcard, page 101.

High Pressure Air Vent

A high pressure air eliminator for automatically venting equipment using steam pressures from 0 to 150 lb is added to the line of venting air valves and air eliminators made by Gorton Heating Corp., Cranford, N. J.

Called the No. 12, the high pressure air eliminator is designed for fast venting and automatic closing on steam processing equipment, such as driers, steam coils, steam amins, unit heaters, and laundry equipment.

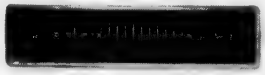
The body of the eliminator is made of cast bronze. It is 2½ in. in diameter, 5½ in. high, overall, and has a ½-in. male and ¼-in. female bottom connection with a hex to accommodate wrenches. The valve seat opening is 3/16 in. in diameter, and the top air outlet is tapped for a ⅛-in. pipe connection, so that where conditions cause excessive condensation it may be piped from the air eliminator.

More information? Circle Item 17 on postcard, page 101.

Return Air Grilles

A line of air conditioning, return air grilles, styled to blend with room interiors, is announced by Air Control Products, Inc., Coopersville, Mich.

Designated the No. 21 and No. 23, the grilles are available for either sidewall or baseboard installations. Vertical fins provide a maximum of free area for each unit.



Six sizes of grilles are available in either product series, from 8 x 6 in. to 30 x 6 in. All units have a two-tone, chameleon beige finish. The face of each grille is modernly styled to blend with interior decor.

The new air conditioning grilles, along with a line of registers, grilles, and diffusers, are described in Catalog 56-AC.

More information? Circle Item 18 on postcard, page 101.

Plastic Pipe Is Approved

The plastic pipe manufactured by Triangle Conduit & Cable Co., Inc., New Brunswick, N. J., will now bear the approval seal of the National Sanitation Foundation, Ann Arbor, Mich.

The purpose of the seal is to allow users to differentiate between plastic pipe made from virgin material and pipe made from scrap material. The awarding of the seal is the result of a two-year series of tests by the Foundation. The company's plastic pipe, as well as the plastic pipe of a number of other manufacturers, was tested during this period. The Foundation will release the results to public health officials and water companies across the country.

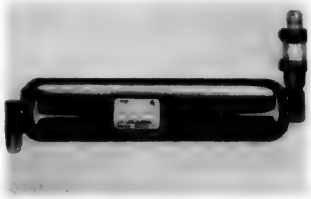
In effect, the seal of approval guarantees that the plastic pipe approved is non-contaminating and safe for the transmission of materials for human and animal consumption.

More information? Circle Item 19 on postcard, page 101.

Refrigerant Line Device

A standard line of refrigerant receiver, filters, drier, and liquid indicator combinations is announced by Remco, Inc., Zelienople, Pa.

The filter and drier end of the combination units consists of the company's Super-Flo, which has a glass fiber depth filter and a molded drying element. The liquid indicator used is the company's E-Z-See, hermetically sealed to prevent leaks in a system. The receiver is made of steel.



Both the filter-driers and liquid indicators are approved by Underwriters Laboratories, Inc. The units are available with top inlet and bottom outlet or bottom inlet and top outlet connections.

The combination can be supplied without the liquid indicator when an elbow connection is used on the outlet end. A combination unit with a check valve on the inlet end and a liquid indicator on the outlet end is also available.

The molded drying unit removes moisture both chemically and physically, also absorbing acids to a level below possible danger from corrosion. Chemically absorbed moisture is retained in the drying element even though refrigerant temperatures rise to 180 deg F. The pyrex glass viewing tubes used in the liquid indicators have a safe working pressure of 500 psi with a 5-to-1 safety factor.

More information? Circle Item 20 on postcard, page 101.

Condensate Pumps

Condensate pumps designated Type S are added to the line of condensate and vacuum pumps manufactured by Sarco Co., Inc., New York, N. Y. The close-coupled, bronze-fitted pumps are furnished with a 12-gal cast iron receiver and have a capacity from 2000 to 8000 sq ft EDR and 3450 rpm.

Convertible from single to duplex, the pumps feature a 7½-in. inlet, a mechanical seal, and a dynamically balanced, enclosed bronze impeller.

No sub-base required for the pumps. They may be taken apart for inspection, without removing the pipe connections, by removing three bolts.

More information? Circle Item 21 on postcard, page 101.

Green Air Filter

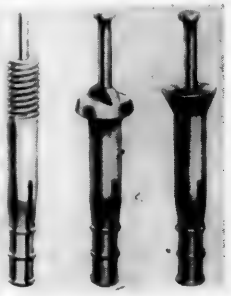
An improved, green air filter for air conditioning units is introduced by American Air Filter Co., Inc., Louisville, Ky.

The glass media filter is available for all standard size air conditioning units.

More information? Circle Item 22 on postcard, page 101.

Pin Bolt Drives

Pin bolt drives for anchoring applications are manufactured by J. D. Polis Mfg. Co., Chicago, Ill.



Inserted into a ¼-in hole of the proper length, the pins are expanded by driving the drive pin with a hand hammer in the same fashion as a nail is driven. The pins are available in three head types—round, flat, and stud—and come in six lengths with a ¼-in. diameter.

The pins can be used for blind hole or toggle-action anchoring in such materials as concrete, brick, wood, tile and cinder block. They are designed to support piping and heating and air conditioning duct work.

More information? Circle Item 23 on postcard, page 101.

A-C Motor Line

Two lines of enclosed, non-ventilated, fan-cooled motors are announced by General Electric Co., Small Integral Motor Dept., Fort Wayne, Ind. The new a-c lines are designated as standard enclosed (illustrated) and severe duty enclosed. They will replace a single line of 1- to 5-hp motors.

The standard enclosed motor features a steel conduit box and fan cover. The conduit box has keyhole mounting to facilitate installation; the mounting screws need not be removed. A ½-in. conduit hole with a ¾-in. knockout is provided. The conduit box has cork Neoprene gaskets.

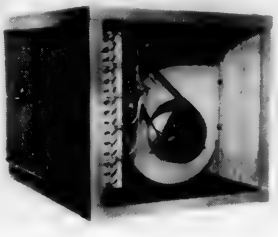
Both lines have longer numbered leads for use with wire nuts, and every enclosed, foot-mounted motor is now equipped with a lifting eye.

The severe duty line is basically the same as the standard line, except for certain features which make the severe duty motor suitable for use in corrosive or excessively moist atmospheres. For example, all threaded parts are coated with a special lubrication to prevent them from seizing. Neoprene-sealed washers on the through bolts and a shaft seal give additional moisture protection. The conduit box and fan cover are made of cast iron for greater corrosion resistance. A stainless steel hardware kit is available for the most severe chemical conditions.

More information? Circle Item 24 on postcard, page 101.

Waterless Cooling System

A 10-ton, air-cooled condensing unit—10ACCU—and a companion, 10-ton, low side unit—10LSU, illustrated—are new products of Typhoon Air Conditioning Co., Brooklyn, N. Y. The waterless air conditioning units are designed for areas where there is a scarcity of water, where water impurities cause a high unit maintenance factor, or where high sewer taxes and plumbing and servicing make water installations both costly and impractical.



The air-cooled condensing unit may be located anywhere outside the conditioned area—in basements, yards, or on roofs. The air handling unit can be suspended from a wall or ceiling, or recessed into a wall.

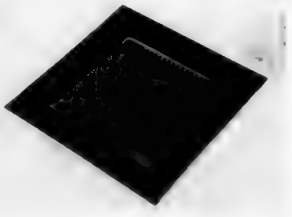
The low side unit performs the functions of cooling, filtering, dehumidifying, and circulating air throughout the conditioned area, either through an attached duct system or as a unit cooler. Where hot water or steam heating is present, it will serve as a heating unit through the addition of a heating coil. Its components are: a centrifugal blower powered by a capacitor-type motor; variable speed pulley; cooling coil constructed of corrosion-resistant copper tubing with bonded helical fins; expansion valve; condensate drain pan with drain connection; heavy-gage insulated steel casing; and air filters. The low side section is also designed for use with the company's 10-ton, water-cooled condenser.

For residential use, the units permit owners of warm air furnaces to convert to year-round air conditioning. In residential applications, the low side unit can be connected into existing hot air duct systems. By means of damper arrangements, the entire system can be changed over from the heating to the cooling cycle.

More information? Circle Item 25 on postcard, page 101.

Vandal-Proof Air Diffuser

A ceiling air diffuser designed to prevent its removal by vandals and fabricated of heavy gage steel is available from Connor Engineering Corp., Danbury, Conn. This modification of the Kno-Draft ceiling air diffuser is recommended for institutions and sanatoriums where tampering may be encountered.



Mounted flush against the ceiling, the diffuser has its air discharge through slots which fit firmly against the outer plate. The outlet presents an unbroken exterior to discourage attempts to damage it.

The capacity and performance of the diffuser are the same as those of the company's standard models.

More information? Circle Item 26 on postcard, page 101.

Shears Are Added to Line

Nine sheet metalworker's snips and shears are added to the line of hand tools manufactured by Niagara Machine & Tool Works, Buffalo, N. Y. There are three compound leverage shears (for straight, right, and left cuts), three straight snips, and three combination snips included in the nine additions.

The compound leverage shears (illustrated) multiply hand pressure to provide cutting power with minimum effort. Eighteen-gage steel can be cut with them. With fifty-two serrations to the inch, drop forged steel jaws are curved to divert the sheared metal. The pliable plastic hand grips have stop posts to prevent hand slippage and to provide finger clearance.

The three models can be identified on a work bench or in a tool box by three different hand grip colors.

The straight snips (in three sizes) are made of drop forged steel and are heat treated.

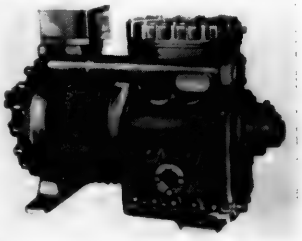
The combination snips (also in three sizes) are designed for intricate pattern and scroll work. Made of drop forged steel, the inner faces of the duck bill jaws are sloped for cutting curves and irregular shapes.

Detailed information and specifications for the snips and shears are contained in Bulletin 78.

More information? Circle Item 27 on postcard, page 101.

10-Hp Compressor

A suction, gas cooled, 10-hp model, designed for air conditioning applications, is added to the motor-compressor line made by Copeland Refrigeration Corp., Sidney, Ohio.



Designated Model 9R8-1000, the compressor measures 27 3/16 in. long, 18½ in. high (on springs), and 14 in. wide, and weighs 337 lb. Its displacement is 1375.0 cfh at 1750 rpm. It has three cylinders with a 2 3/16-in. bore and a 2-in. stroke. The refrigerant used is F-22.

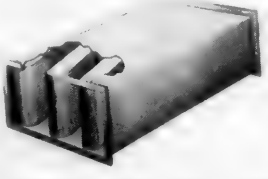
The use of refrigerant to cool the motor windings eliminates the need for compressor cooling fans or water connections. The unit's design permits its installation in packaged or remote air conditioner condensing units in the 10-hp size. It can also be used in combinations for packaged air conditioners of larger size.

Descriptive literature covering specifications, capacity, and motor data is available.

More information? Circle Item 28 on postcard, page 101.

Packaged Duct Silencer

Packaged standard silencing units for air conditioning ducts are manufactured by Industrial Acoustics Co., Inc., New York, N. Y.



Known as Q-Duct, the prefabricated, standardized silencer can be fitted into an air conditioning system during the design stage of the installation. This is made possible by the fact that the silencer is available in 148 sizes to meet dimension and performance requirements. Acoustic noise reduction curves as well as pressure drop data are presented for each unit.

In determining the proper unit to use in air conditioning systems, the mechanical design engineer can select the correct unit from data sheets containing information on noise reduction, pressure drop, and the size of the unit. The silencer can also be attached to blower intakes and discharge systems or other situations where a noise associated with airflow has to be silenced.

More information? Circle Item 29 on postcard, page 101.

Strainers and Air Eliminators

Strainers and air eliminators for use with liquid meters have been redesigned by Meter and Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa. The new models are the 763 strainer and the 764 air eliminator.

Chief advantages of the new strainers are larger screening area and a double basket which protects the inner screen from being stretched or distorted by fast-moving large particles.

The strainers are available in both in-line and angle models. They include 2-in. screw models and 3-, 4-, and 6-in. flanged models. All are available in both 125-lb cast iron and 125-lb bronze construction with either 125 or 250 drilling—and in cast steel with either 600-lb Series 30 or 1200-lb Series 60 flanges.

Angle-types with center-to-face dimensions equal to a standard 90-deg ell or the corresponding pipe size, are available in 125-lb cast iron or bronze construction in 2-, 3-, 4-, and 6-in. sizes.

Features of the air eliminators include access to all working parts and in-line outlet and inlet connections. Access to working parts is achieved by removing four bolts in the valve body flange and lifting out the air release valve assembly. Service work requires only the use of hand tools. In-line connections eliminate the need for elbows. Other advantages include replaceable valve faces and seats, resilient facing protecting the main and pilot valve assemblies, and a toggle-type float arm to the pilot valve linkage. The eliminators are available with steel bodies in 2-in. screw models and 3-, 4-, and 6-in. flanged models, or with corrosion-resistant 316 stainless steel bodies in 2- and 3-in. sizes.

More information? Circle Item 30 on postcard, page 101.

One Set Pipe Bender

Pipe bends up to 90 deg can be made in one setting of the pipe and one stroke of the ram with the S-130 hydraulic pipe bender introduced by Blackhawk Mfg. Co., Milwaukee, Wis. The bending frame, swivel, and bending shoes are made of lightweight aluminum.

A feature of the bender is a removable top plate that permits setting the shoes and positioning the pipe for bending. By removing the top plate, pipe can be inserted from the top and the bending job accomplished without the loss of time encountered with sliding pipe in from the side. The bender will work in any position—on the floor, on a table, or overhead on existing runs.

Also featured in the unit is an angle gage which permits the operator to have visual control of the progress of the bend with every pump stroke. The gage facilitates making 180-deg bends, double offsets, compound, and repeat bends. No tables, calculations, or measurements are required.

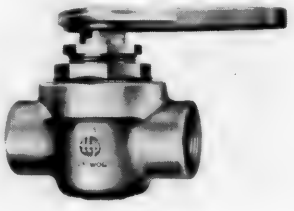
When mounted to a swivel shoe, the angle gage becomes an integral part of the bender. Readings from 0 to 105 deg are visible either through holes in the bending frame or on the exterior of the bender.

Six cast aluminum bending shoes handle ½, ¾, 1, 1¼, 1½, and 2-in. diameter pipe or conduit. The shoes are set on the plunger and a lock pin dropped into place; no threading of shoes on the ram is required. The remote-controlled hydraulic power unit can be used separately as a maintenance jack. For big jobs, a motor-driven pump is available.

More information? Circle Item 31 on postcard, page 101.

Injection Molded Plug Valve

A plug valve that is injection molded of polyvinyl chloride is being marketed by Tube Turns Plastics, Inc., Louisville, Ky. It is designed to handle a variety of corrosive fluids.



Teflon bearing buttons on the plug provide a self-lubricating characteristic. Other features of the valve are a straight-through port that makes possible unimpeded flow conditions, adjustments to compensate for wear, positive closing, and self-indicating port positions. A nub on the bottom can be tapped for insertion of a drain plug if desired. The valve is furnished with threaded ends, or with socket type ends for solvent welding.

The valve can be used in many cases to replace valves of special alloys, stainless steel, less suitable plastic materials, or those lined with glass, porcelain, stoneware, or hard rubber.

At present the valve will be furnished in 1, 1½ and 2-in. sizes, to match pipe of corresponding nominal size. The sizes may also be used with ½, ¾, and 1¼-in. piping by employing bushings. Later, the company will go into the production of 3- and 4-in. valves.

More information? Circle Item 32 on postcard, page 101.

Electronic Air Filter

An electronic device, known as the Puriton, that will remove smoke, dust, and odors as it filters and changes the air five times an hour is introduced by Michael Electric Co., Inc., New Haven, Conn.

As small as an average office inter-com unit, the device is portable and needs only to be plugged into an electric outlet to operate. In addition to eliminating smoke, it will rid a room of air-borne bacteria. It removes the smoke, dust, and pollen by forcing the air through a Fiberglas filter.

Westinghouse ultraviolet germicidal lamps contained in the unit produce ozone which kills the disease bacteria in the air and at the same time counteracts odors.

More information? Circle Item 33 on postcard, page 101.

Packaged Air Conditioners

Packaged air conditioners, with 10, 15, 20, 25, and 30-ton capacities are available from Alton Mfg. Co., Dallas, Tex.

Designed for installation in medium to large commercial establishments—stores, office buildings, warehouses, small factories and large homes—the units have the evaporative condenser built-in so that a separate cooling tower or condenser is not needed. The units are built on a base of ship channels with an angle iron structural frame that is totally enclosed by galvanized and painted, steel panels.

The evaporative condenser section consists of bare copper tubing, without fins to assure an adequate air and water flow. The blower and tank assemblies are made of hot-dipped, galvanized steel, as are the eliminator plates between the coil and blower. Refrigerant condensation is accomplished through the use of a fine water spray over the condensing coils. The only water required is to make up for evaporating losses.

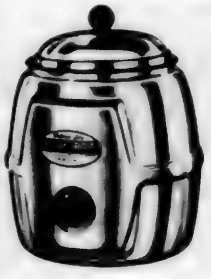
All sub-assemblies, wiring, refrigerant piping, and testing are done at the factory, before shipment, so that the units may be installed readily at the site. Automatic controls are located in a plastic enclosed panel to permit their inspection.

More information? Circle Item 34 on postcard, page 101.

Pot Controls Flux

A pot for warming and controlling brazing and soldering flux is being marketed by Helmco, Inc., Chicago, Ill.

The flux pots are manufactured in two sizes, one holding 5 and the other slightly over 10 lb of flux. The exteriors are made of satin-finish aluminum. Glazed, vitreous enamel bowls prevent contamination of the flux. The heating elements are insulated, and a dial thermostat allows temperature setting adjustments and control.



The 10-lb unit operates on 110-120v, a-c, 350 watts, and has a shipping weight of 8 lb. It is 12 in. high and has a diameter of 11 in. The 5-lb unit operates on 110-120v, 175 watts, with a shipping weight of 7 lb, and has a height of 11 in. and a diameter of 9 in.

More information? Circle Item 35 on postcard, page 101.

Water Coolers Have Color

Drinking water coolers are offered with colored tops by Uniflow Mfg. Co., Erie, Pa. The tops are available in six decorator colors: spruce green, peer blue, burgundy, grey, black and white.

The units are being made with colored tops to complement the interior settings of offices, reception rooms, or factories.

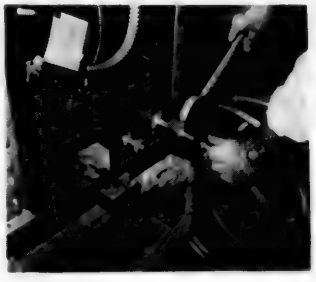
Pressure type coolers are equipped with bubbler or glass filler attachments and a foot pedal control. The coolers are available with or without refrigerated compartments. The cabinets are finished in pearltone grey or stainless steel.

Tops in decorator colors are offered as standard equipment with the coolers at no increase in price.

More information? Circle Item 36 on postcard, page 101.

Refrigerant Line Coupling

A self-sealing coupling (No. 511017), designed for use with Freon-12 and Freon-22, has been developed and is being produced by Aeroquip Corp., Jackson, Mich. for use by the refrigeration and air conditioning industry. The coupling is available in ¼- to 1½-in. sizes, and provides a seal that excludes air upon disconnection or connection.



Condensor and evaporator units and their connecting tubing in various length are pre-charged with Freon at the factory, sealed with the Freon coupling halves, and shipped completely pre-charged. When the units are set in place in a purchaser's building, the lines are connected (as illustrated) by mating the proper coupling halves, and the system is ready for operation.

More information? Circle Item 37 on postcard, page 101.

Stainless Steel Fittings

Stainless steel fittings called Quikupl are to be sold and serviced by Vanton Pump & Equipment Corp., Hillside, N. J.

The stainless steel fittings permit the installation of pipe or tubing without welding, threading, or flaring. They can be assembled or disassembled readily and are available with a variety of seals for use with corrosive and hazardous solutions. Neoprene, butyl, and thiokol seals are now in stock, with research underway to provide other materials offering greater corrosion and higher temperature resistance.

More information? Circle Item 38 on postcard, page 101.

Temperature Recorder

A remote-reading, recording thermometer (Tempscribe Model TTR) with a temperature-sensitive bulb and 6 ft of flexible capillary tubing is offered by Bacharach Industrial Instrument Co., Pittsburgh, Pa. The recorder may be placed outside of a refrigerator, freezer, or cooler, at any convenient viewing point, with the flexible capillary tubing inserted between the door and jamb, or the cover and frame. There is no need to open the door or remove the cover to observe the temperature inside the unit.

A pen operating mechanism, to which the capillary tubing is connected, is housed in the instrument's door, which is removable. The pen can be set to conform to the test thermometer by means of an adjusting screw. The instrument can be converted from one temperature range to another by replacing the door. Two ranges for remote temperature recording are currently available: −30 to +50 deg and 10 to 90 deg F.

The instrument's chart is driven by a spring-wound clock movement, 24-hr rotation. The charts are 4½ in. in diameter, have uniform graduations, are self-centering, and are changed by swinging open the instrument's hinged door.

The overall size of the recorder is 5½ x 4½ x 7½ in. high. The temperature-sensitive bulb is approximately ⅜ in. in diameter and 3¾ in. long. The instrument is furnished with a bulb and tube mounting reel that snaps into the back of the clock housing, 100 charts, and a bottle of ink.

Instrument doors are also available with built-in bimetal elements for recording ambient temperature or with electro-magnetic armature for recording cycling and total running time of motors and heaters. For ambient temperature recording, ten different ranges are available, from minus 30 to plus 120 deg.

More information? Circle Item 39 on postcard, page 101.

Pump Lifts to 21 Ft

A condensate removal pump (Model C) for air conditioning equipment is manufactured by March Mfg. Co., Inc., Skokie, Ill. The pump is capable of vertical lifts to 21 ft and horizontal runs to 300 ft.

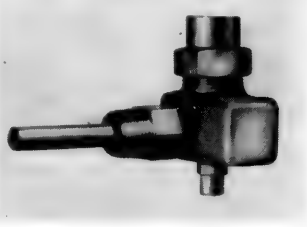
Directly proportional to both lifts and runs, the capacity of the pump is 100 gph at zero lift and 8.5 gph at the maximum lift of 21 ft. The overall height of the pump is 6¼ in. It has a ⅛-in. pipe outlet (female thread) which permits the use of a brass hose connector for rubber hose, a ¼ in. flare fitting for ¼ in. copper tubing, or for attaching a ⅛-in. pipe directly to the outlet.

Available either in 115v or 230v, 60 cycle, a-c, the motor is equipped with automatic reset thermal cutouts.

More information? Circle Item 40 on postcard, page 101.

Gas Cutoff Valve

Gas cutoff, safety valves for applications on domestic water heaters are announced by The Patrol Valve Co., Cleveland, Ohio.



The valves stop the flow of gas to the water heater thermostat before a hazardous water temperature is reached. After the cause for overheating in the water heater is corrected the valve can be reset manually.

Model GCO-12 has ½-in. female pipe connections, and Model GCO-38 has ⅜-in. female pipe connections.

The valve seat and other related mechanisms are not exposed to corrosion and scale. The valve will operate in any position and requires no adjustments.

More information? Circle Item 41 on postcard, page 101.

Black Protective Paint

An all-purpose black coating for protecting metal, wood, or concrete against exposure is announced by Maintenance Inc., Wooster, Ohio.

Offered under the trade name Everwear J-41-B, the paint forms an ebony black finish that is impervious to moisture and resistant to chemical attack by gas fumes and smoke. Because of its penetrating and spreading qualities, it can be used after a minimum of surface preparation to either preserve or restore the appearance of most materials. It is anti-corrosive above or below grade.

The paint expands and contracts with metal during extreme temperature changes. This allows its use on tanks, metal roofs, siding, drains, bridges, beams, girders, cables, and window frames.

Among its applications for preserving wood are joists, floor beams, posts, trestles, mine timbers, towers, signal posts, poles, and cross ties. The concrete surfaces for which it is adapted include masonry walls, parapets, footings, retaining walls, brick and cement block structures, tanks and silos.

The coating paint dries quickly and is adaptable to either brush or spray application. It is packaged in 5 gal pails and 30- and 55-gal drums.

More information? Circle Item 42 on postcard, page 101.

Remote Air Conditioners

A line of remote, air-cooled air conditioners is expanded by Marvair Div., Muncie Gear Works, Inc., Muncie, Ind., with the addition of two new models.

The new remote units are a 2-hp model delivering 21,000 Btu per hr and a 5-ton unit delivering 60,000 Btu per hr. With the present 2-ton and 3-ton models, they complete the line of remote, waterless models for homes as well as for a variety of commercial and institutional uses.

Each model includes a condenser-compressor section that may be installed anywhere within an average of 60 ft of the evaporator or cooling section—outdoors, in garage, basement, or attic. For one-story stores or plants, the condenser unit may be placed on the roof. The compressor is housed in an insulated cabinet with the condenser section to reduce the sound level; the use of a sirocco-type fan further reduces the noise. All controls are in watertight housings within the condenser cabinet.

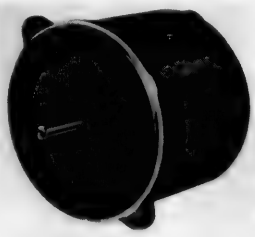
The evaporator section features a 4-row, coil assembly. Two types are offered: the horizontal air-flow and the vertical air-flow (A-type). The A-type is installed directly above or below a warm air furnace and requires no separate blower or filters. It is adaptable to counterflow or upflow furnaces.

The horizontal air-flow unit may be located in the main furnace duct, in an attic or closet, using its own ductwork, or—with a filter and blower—as a free-hanging unit in stores, offices, plants or institutions. In this latter application it is suspended from the ceiling and has the advantage of occupying no floor space. Four-way louvers direct the cool air output in any desired manner.

More information? Circle Item 43 on postcard, page 101.

Oil Burner Motor

A lightweight motor for oil burners is announced by The Ohio Electric Mfg. Co., Cleveland, Ohio. Rated at ¼ hp, the new unit is designed for heavy duty service in oil burners used in industrial plants, institutions, and apartment houses.



Built to NEMA specifications with a No. 56 frame, the motor is designated Series 991. It is available either for 115 or 230v, 50-cycle (1450 rpm) or 60-cycle (1725 rpm) operation.

Weighing 16 lb, the motor has a breakdown torque of 29 oz-ft and a locked-rotor torque of 17 oz-ft. It is completely enclosed and is based on three-piece construction. The end-bells are die-cast aluminum alloy, each with twelve strengthening ribs to provide rigidity and to assure close machine tolerances. The stator ring is fabricated from a single piece of 12-gage steel. The stator coils are insulated with Class A insulation.

The rotor core is an aluminum alloy die casting to minimize porosity. Its assembly is turned to a close tolerance to maintain a constant air gap. Lubrication is required once a year.

The motor is supplied with rubber-covered leads as standard, with cord or cord sets, or with special lead outlets, and is finished with flat black paint.

More information? Circle Item 44 on postcard, page 101.

Combination Pipe Wrapping

A pipe wrapping which combines an under-wrap of glass fiber insulating material and an outer-wrap of vapor sealing tape is available from Rhopac, Inc., Skokie, Ill., under the trade name Easy-Wrap.

The wrapping prevents condensation and sweating on cold water pipes, insulates hot water pipes, and protects them against freezing when exposed to lower temperatures.

A progressive spiral wrapping of the glass fiber insulating material is made around the pipe, and the vapor sealing tape is wrapped over it in a counter-spiral fashion. It is available for both home owners and in bulk for commercial use. For the home owner, the wrapping is packaged in a carton which contains 25 ft of 3 in. wide glass fiber insulation and 25 ft of 2 in. wide vapor sealing tape.

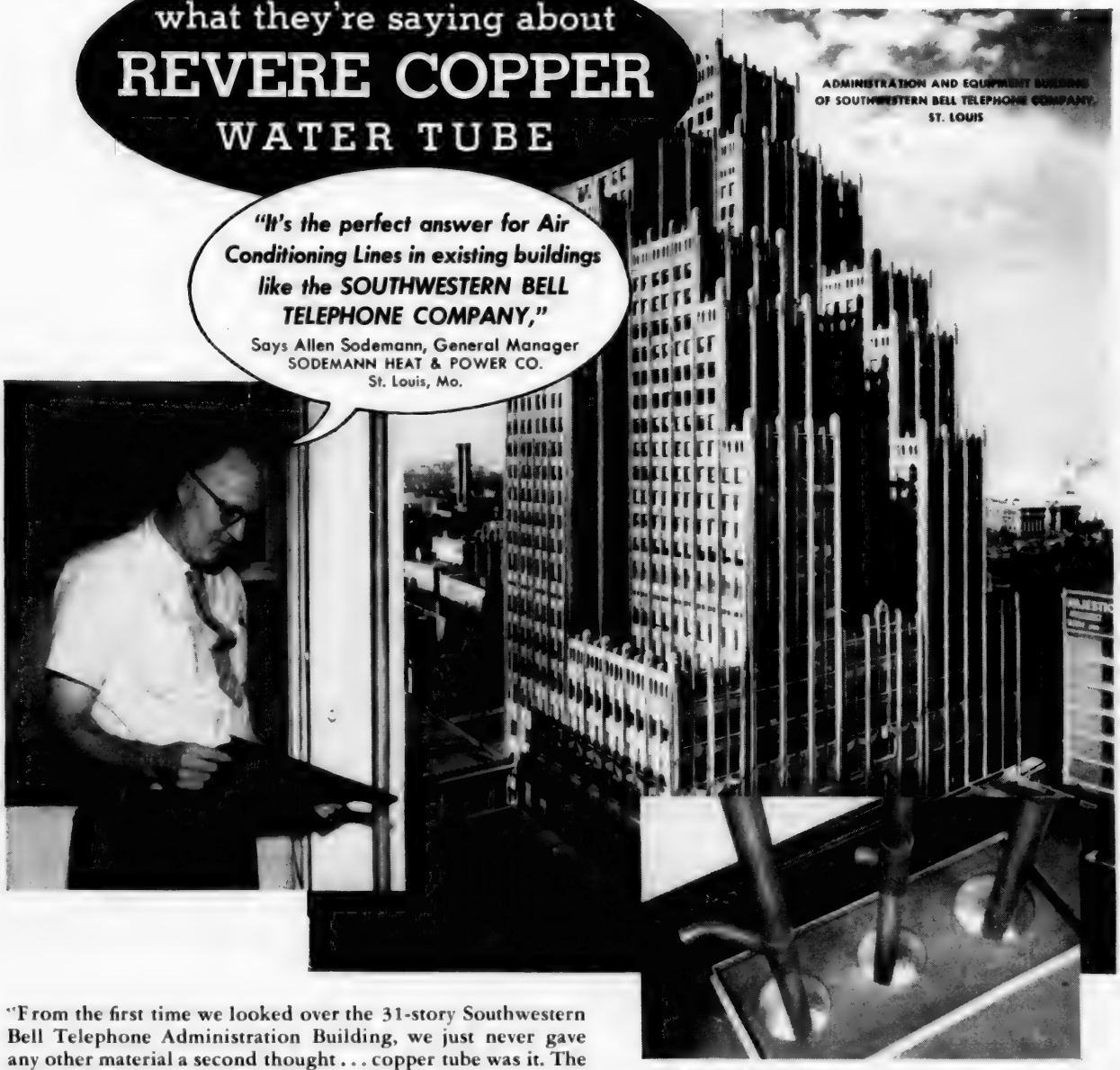
More information? Circle Item 45 on postcard, page 101.

(*Continued on page* 122)

what they're saying about REVERE COPPER WATER TUBE

"It's the perfect answer for Air Conditioning Lines in existing buildings like the SOUTHWESTERN BELL TELEPHONE COMPANY,"

Says Allen Sodemann, General Manager
SODEMANN HEAT & POWER CO.
St. Louis, Mo.

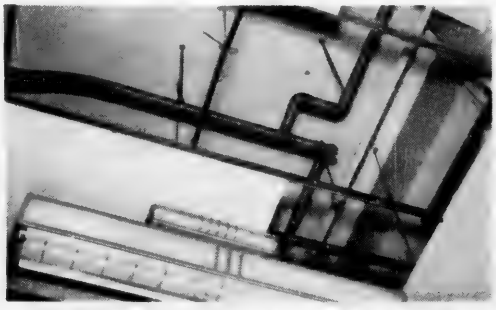


ADMINISTRATION AND EQUIPMENT BUILDING OF SOUTHWESTERN BELL TELEPHONE COMPANY, ST. LOUIS

"From the first time we looked over the 31-story Southwestern Bell Telephone Administration Building, we just never gave any other material a second thought . . . copper tube was it. The job had to last . . . and what's more enduring than non-rusting copper? The installation had to be made as fast as possible and with the minimum of rip-up. With the long lengths of copper tube and solder fittings requiring no wrench room or thread cutting, copper again was the answer."

It is these same attributes that make Revere Copper Water Tube the first choice of contractors, architects and engineers for radiant panel heating, hot and cold water lines, processing lines, underground service lines, drain, waste and vent lines. See your Revere Distributor for your needs.

ONE OF THE 1,101 SETS of risers around the perimeter of the building. Using solder fittings with silver alloy brazing made installation speedy, safe, sure.



REVERE COPPER WATER TUBE is made to order for small spaces like those encountered in this false ceiling. No wrench-room needed when you use Revere Copper Water Tube. The 45,000 lbs. of Type "L" Revere Copper Water Tube used were supplied by GRINNELL COMPANY, Revere Dist.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

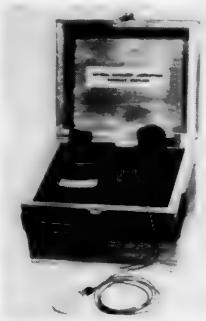
COPPER * BRASS * 18 01 * REVERE * ALUMINUM

(*Continued from page* 120)

Portable Heat Flow Meter

A portable meter, called the HFG-2 Heat-Flow Monitor, which reads heat flow directly in Btu's is offered by National Instrument Laboratories, Inc., Riverdale, Md.

The core of the instrument is a 2-in. diameter, ⅛-in. thick disc, whose output is 250 microvolts per BTU per sq ft per hr. Its applications extend from checking the efficiency of structural, pipe, or window insulation to exploring the heat-flow loss of refrigerated or heated areas.



Housed in a case, the 7-lb instrument includes the meter and polarity, range and transit switches. The latter is for the protection of the meter while the unit is carried from one location to another. The disc, connected by 6-ft leads to a plug-in resistance box, comprises a separate pre-calibrated assembly, which is interchangeable for future replacements.

Heat-flow measurements are made in ranges of 0-30, 0-60, 0-300, and 0-600 Btu per sq ft per hr. The precision of readings is 1% and the meter accuracy 0.3%. While no limit exists for applications at low temperatures, the contact surface should not be higher than 160 deg F for the disc used with Model HFG-2.

More information? Circle Item 46 on postcard, page 101.

Diffuser Mounts on Wall

An out-of-the-wall diffuser is added to the line of air diffusers made by Air Control Products, Inc., Coopersville, Mich. The unit is cataloged No. 16 by the company.

Designed for applications where stack-head and duct cannot be put in the wall, the diffuser can be installed on concrete or cinder block applications or on many types of old construction that require remodeling.

The unit has two parts, a back section that fits against the wall, with a pre-cut hole in the bottom, and a diffuser which screws to the front. This unit provides the same air pattern as the company's No. 15 sidewall diffuser.

The diffuser is available in two sizes, 10 x 6 and 12 x 6. Details on both models can be found in Catalog, 56-AC.

More information? Circle Item 47 on postcard, page 101.

Convector Has Snap-On Front

A convector designated Type C is announced by The Trane Co., La Crosse, Wis. The convector has a snap-on front panel, single piece, rolled top and sides, and clips to hold the heating element.

With the snap-on front panel, a coin is the only tool needed to remove the panel. The front snaps into place by pushing its bottom against the convector enclosure and swinging up.

The single piece, rolled top and sides permit a plaster or wood baseboard to be brought out flush with the front of the convector without interfering with the removal of the front panel. This is possible because the enclosure forms part of the convector's front.

Another advantage is that the front panel can be removed without disturbing the damper chain because the chain comes through a slot in the enclosure, rather than through the front panel grille.

Through the use of heater clips, the heating coil may be pitched by raising one end. This allows unlimited pitch on longer units, or whenever this convenience is desired for any other reason.

More information? Circle Item 48 on postcard, page 101.

Lavatory Has Integral Back

A vitreous china lavatory with a 4-in. integral back is available from Universal-Rundle Corp., New Castle, Pa.

Called the Caldwell, the lavatory is designed to be mounted with a one-piece steel hanger for wall-hung installations. China legs are available for mounting the rim 24, 27, or 31 (illustrated) in. high. If preferred, the lavatory can be used with the company's round or hexagonal chrome legs and towel bars. The back and rim heights provide several installation possibilities, such as schools, churches, office buildings, institutions, and other industrial and commercial installations.

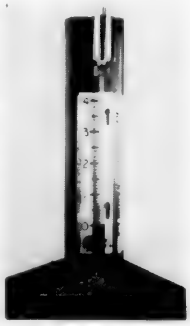
Made in both 4- and 8-in. centerset models, the lavatory is 20 x 18 in. in size, weighing approximately forty-four pounds. It is available in white, blue, gray, green, tan, yellow and pink.

More information? Circle Item 49 on postcard, page 101.

Well Type Manometers

Well type manometers are made by The Henry G. Dietz Co., Long Island City, N. Y., for making measurements of pressure, vacuum and differential pressure either in units of inches of water or inches of mercury.

The units can be wall mounted or used on a table top. Conversion from wall mounting to table top use is made by fastening two sheet metal brackets, supplied with each unit, to the sides of the manometer. Straight wall Pyrex tubing is used as the indicating tube which is connected directly to a Pyrex well.



The manometers are supplied with excess pressure safety traps constructed of brass to prevent the loss of fluid due to surges in line pressure. All manometers are supplied with our standard scales, but, if desired, special scales can be imprinted to specifications at slightly extra cost.

More information? Circle Item 50 on postcard, page 101.

(*Continued on page* 124)

Sarco Condensate and Vacuum Pumps give you this big advantage...

UNDIVIDED RESPONSIBILITY
by Sarco for pumps as well as heating specialties!

Now Sarco expands its extensive heating line...by adding *condensate and vacuum pumps*...offering you in still larger measure the protection and convenience of *undivided responsibility*.

Shown above is one of the many Sarco pumps...it's the streamlined Sarco type S condensate pump. Designed and built to Sarco's traditionally high quality standards, it assures you top performance and long, trouble-free life. The many advantages include:

...Low 7½" inlet...Close coupling...No sub-base needed. Inspection? Just unscrew 3 nuts and lift the motor; no need to disconnect the piping. For a complete list of features, mail the coupon today.

Selection—The experienced Sarco-Sarcotherm engineering staff will gladly help you select the right Sarco condensate or vacuum pump for each job.

Undivided Responsibility—From *one* reliable "Complete Line" source...SARCO-SARCOTHERM ...get not only condensate and vacuum pumps but also heating specialties, steam traps, temperature regulators, finned-tube radiation, and weather-compensated control systems for steam and hot water heating.

SARCO—SARCOTHERM

MAIL COUPON FOR THESE BULLETINS

Sarco Company, Inc.
Sarcotherm Controls, Inc.
Empire State Bldg., New York 1, N. Y.

Please send me:

☐ Bulletin on New Sarco type S Condensate Pumps.

☐ Bulletin on all Sarco Vacuum and Condensate Pumps.

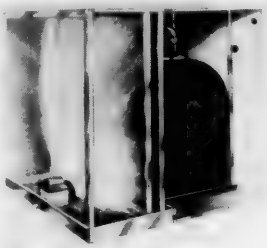
Name_____
Firm_____
Address_____
City_____ State_____

2158-B

(*Continued from page* 122)

Air Washer Cooler

An air washer type evaporative cooler for residential and commercial applications is being manufactured and marketed by Alton Mfg. Co., Dallas, Tex.



Made in five sizes with air handling capacities from 4000 to 12,000 cfm, the units are designed for large volume cooling and ventilation. Cooling is achieved by drawing fresh make-up air through a water spray that is washed over a double set of filter mats.

A panel construction is used throughout that consists of heavy gage galvanized sheet steel protected with a glossy paint. A hermetically sealed motor driven pumping unit is utilized on the 4000- and 5500-cfm units, while the 7000- to 12,000-cfm coolers are equipped with a specially designed pumping unit. A float valve mechanism automatically regulates the coolers evaporative water requirements.

The coolers are suitable for laundries, dry cleaning plants, commercial buildings, and homes.

More information? Circle Item 51 on postcard, page 101.

Cement for PVC Piping

A solvent cement for joining polyvinyl chloride pipe fittings and flanges has been developed by Tube Turns Plastics, Inc., Louisville, Ky.

A cemented joint can be handled in an hour and reaches working strength in 48 hours. An ordinary paint brush usually serves as the applicator.

The solvent cement may be obtained from the company's distributors or from the factory. It is furnished in pints, quarts, and gallons.

More information? Circle Item 52 on postcard, page 101.

Pilot Operated Valve

A 1-in., two-way globe type, pilot operated solenoid valve with packless construction is available from Atkomatic Valve Co., Inc., Indianapolis, Ind.

Made of stainless steel, the valve has been designed to operate at pressures ranging from 10 to 3000 psi and is available in any voltage. The standard model is normally-closed, but, with modification, it can be made normally-open through 300 psi and with the use of a relay to 3000 psi. With a relay, power must be supplied at all times, since the valve will not open on power failure.

There are two variations of the basic valve: Type SS, with a standard coil, for operation to 300 psi, or Type HPSS, with a high pull coil, for applications to 1500 psi. Over 1500 psi and to 3000 psi, a double wound coil and relay are required. The function of the relay is to energize a primary winding, giving a strong impulse to positively open the pilot valve. The secondary winding is then cut in, holding the valve open at low current consumption.

Features of the valve include: all parts coming in contact with the medium are made of 316 stainless steel, except for the magnetic armature, which must be 416 stainless steel; the ability to operate at high pressure; and full ported construction.

More information? Circle Item 53 on postcard, page 101.

Flux for Copper and Alloys

A soldering flux is being made by Hi-Grade Alloy Corp., Chicago, Ill., to decompose during the soldering of copper and copper alloys, leaving the parts free of flux residues that would cause corrosion or interfere with subsequent surface finishing operations.

Designated No. 29, the soldering flux eliminates the need for washing and buffing operations after soldering to remove flux residues. It flows and penetrates through oil films into cracks and crevices so that the solder can form a lasting bond.

A typical application of the flux is in the soldering of brass plumbing goods and copper tubing.

Additional information and free samples are available.

More information? Circle Item 54 on postcard, page 101.

Washable Air Filter

An electrostatic air filter is being marketed under the name Electronaire by Hadley Products Co., Inc., Marietta, Ohio.

The frame of the air filter is made of 0.032-gage aluminum. The grille is made of 0.025-gage expanded aluminum. The interior construction consists of a spring-tension arrangement on which a patent is pending.

One of the features of the air filter is the filter pack. It is made of a thermo-plastic material produced by Dow Chemical Co. The material provides the electrostatic attraction which filters out and holds dust, dirt, and pollens.

The filter pack is impervious to acids, liquids, gases, and chemicals.

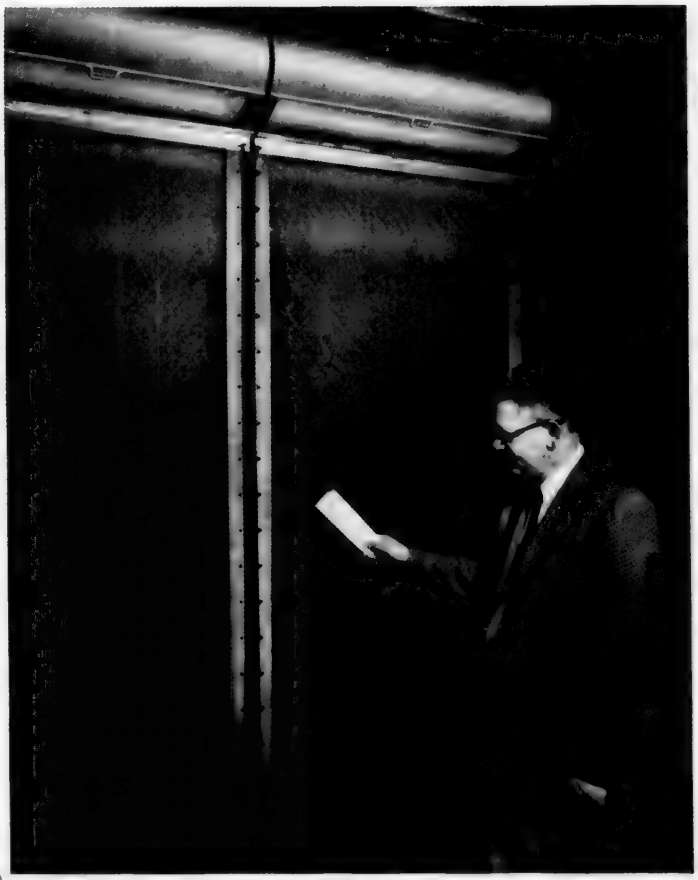
Water is all that is necessary to clean the air filter. The filter is immersed in clear water or washed with a hose shooting the water through in the direction opposite to that in which the air has been flowing. If the air has deposited grease on the filter, a mild detergent can be used to do the cleaning and will not hurt the filter. No oiling is required to hold the dust in the air filter.

The company offers the air filter in ½- and 1-in. thicknesses and in standard dimensions as well as special dimensions required by air conditioning and heating manufacturers. The special sizes are quoted on request.

More information? Circle Item 55 on postcard, page 101.

(*Continued on page* 126)

Dust, Dirt—and Maintenance HEADACHES Removed by Roll-O-MATIC



AAF AIR FILTER REQUIRES ONLY ONCE-A-YEAR SERVICING

THE filter curtains of this two-section ROLL-O-MATIC were once as white as the paper held in the man's hand. Now, note the gradation of color from light gray to black on the curtains' surface. When the accumulated dust load increases operating resistance to a predetermined level, ROLL-O-MATIC takes matters into its own hands—introduces automatically just the right amount of clean media from the rolls at top, while the dust laden media is re-rolled at the bottom.

No one has to guess when or how much clean media is needed. No bells clang or red lights flash to summon a maintenance crew. The ROLL-O-MATIC "just keeps rolling along" cleaning the air and itself automatically.

A 65 ft. length of ROLL-O-MAT media compresses into a compact roll only 13" in diameter. Under normal operating conditions, a single roll represents a *full year's supply* of clean air for a ROLL-O-MATIC section up to 11 ft. high (18000 cfm). Its cost—just half that of disposable filters of equal capacity. Its savings—countless maintenance man-hours plus the "worrying time" of management.

For complete information on this proven renewable media air filter, call your local AAF representative or write for ROLL-O-MATIC Bulletin 248.

AAF herman nelson

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF Dust Control Equipment

Illinois Steam Heating Specialties

BETTER AIR IS OUR BUSINESS

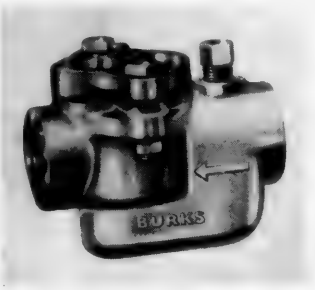
Herman Nelson Unit Heaters

Herman Nelson Unit Ventilators

(*Continued from page* 124)

Horizontal Line Check Valve

A horizontal line check valve (No. 8416) that is tapped for 1-in. pipe connections is introduced by Decatur Pump Co., Decatur, Ill.



Housed as a line-check, the valve is horizontal in application, but the poppet works vertically. The direction of the water flow through the valve is indicated by an arrow on the side of the housing.

To examine or clean any working parts of the valve, the removal of two bolts frees the cap and gives access without disconnecting pipe lines.

At 800 gph, the valve shows about one head foot of friction. On a shallow well with a pumping level at 20 ft, or lower, the difference in friction within the line check valve can mean a difference of several gallons a minute.

Two features of the valve are the tapping for a vacuum gage or other ¼-in. use and a ⅛-in. tapping on the pressure side for an air volume control connection.

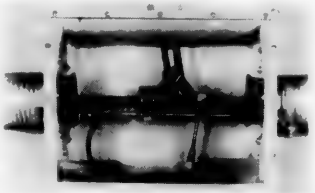
More information? Circle Item 56 on postcard, page 101.

Hot and Cold Air Mixer

An attenuator-diffuser unit that mixes hot and cold air without changing the volume of the air supply has been developed by Anemostat Corporation of America, New York, N. Y.

For use in dual duct, high velocity systems, the diffusing unit controls the air temperature without requiring adjustments of the refrigeration equipment. All air is processed at the central unit, and no coils are present in the individual room units.

The proportional mixing valve located inside the attenuator chamber (illustrated) controls both the warm and cold air supplies simultaneously. Temperature may be regulated by manual control, remote-manual control, or automatic room thermostats. The operation of the mixing mechanism in the attenuator box is based on a compensating linkage which opens and closes the hot and cold duct outlets (both are shown half open) in an inverse ratio, so that the total air supply is held constant, according to the initial pressure tap setting. The rocker arm compensates for variations in spacing between linkage components. As the amount of warm air is increased the proportion of cold air is decreased by the same amount.



If a thermostatic control is used, a modulating needle valve on the thermostat releases compressed air from a low pressure cylinder, actuating a compensating linkage in the attenuator which opens and closes the respective duct outlets. Remote-manual control is exercised through a connecting cable to the compensating linkage, and in manual control directly at the box.

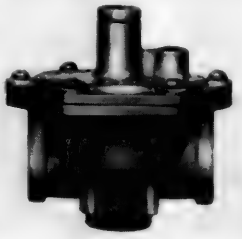
In the diffuser design, the arrangement of concentrate cones brings room air into the diffuser section where it is mixed with the supply air before being ejected into the conditioned area. This increases the permissible temperature differential and reduces the amount of required air supply.

The diffusers are of various designs and bring into the diffuser section up to 100% of room air to mix with air supplied from the ducts.

More information? Circle Item 57 on postcard, page 101.

One Regulator Replaces Two

A gas pressure regulator is being manufactured by Major Controls Co., Corona, Calif., to take the place of two standard sizes used on most volume production gas heaters. By doing the work of two regulator sizes, the unit makes it possible for manufacturers to reduce stock and maintain flexibility on the assembly line.



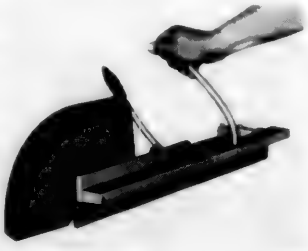
Designated Model H250, the pressure regulator is a ½- and ¾-in. pipe size, in-line regulator with a capacity of 126,000 and 139,000 Btu per hr, respectively. The body of the regulator is provided with vise grips, and the hexagonal flange shape facilitates its installation in confined heater spaces.

Tested and certified by the AGA, the regulator is cast and fabricated of lightweight aluminum alloy in the company's own plant.

More information? Circle Item 58 on postcard, page 101.

Device Makes Corner Bends

A sheet metal bender that reduces hand labor and speeds up the production of elbows and other fittings is introduced by Bett-Marr Mfg. Co., Hopkins, Minn. The device mechanically makes inside corner bends that have had to be done by hand.



Called the Cheek bender, the machine has a 12-in. throat and accommodates up to 20-gage metal. Its shipping weight is 41 lb.

Changeable strips make the bender adjustable for bends in varying widths. The unit comes equipped with strips for ¼- and ⅝-in. bends. Strips for ⅜- and ½-in. bends are also available.

For its installation, the bender comes with two lag bolts furnished, ready to set up on the bench. The machine has a grey hammer finish.

More information? Circle Item 59 on postcard, page 101.

(*Continued on page* 128)

Where ultra-quiet operation, dependable performance and fine appearance are important... check

Modine Airditioners ✳

COOL, HEAT, VENTILATE

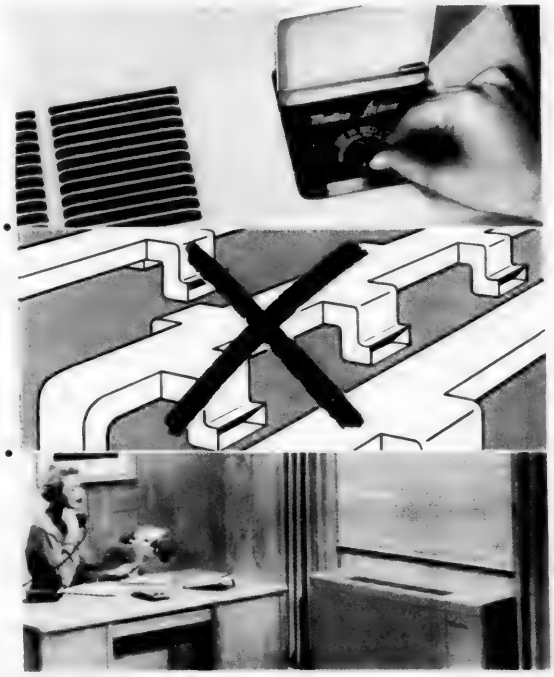
Whether you're planning to build or remodel, Modine AIRditioners are designed for year 'round heating, ventilating and air conditioning. Individual controls keep room occupants comfortable, satisfied . . . save owners money on fuel costs. Ultra-quiet, resiliently suspended motors and fans (1050 rpm) meet the most exacting noise-level requirements.

ELIMINATE EXPENSIVE DUCT WORK

Modine AIRditioners combine the best of central and unit type systems. They heat with hot water from a central boiler, cool with cold water from a central chiller. Same piping — water supply and return plus drain — is used for both. Operation of fan ventilates rooms during intermediate seasons.

IN STYLES AND SIZE FOR EVERY NEED

Sleek, modern lines add dignity and decor to any design motif . . . enhance livability of hotel, motel, office, apartment or home. Four distinct types to choose from — ceiling, overhead, concealed and console models — all styled by Jean Otis Reinecke.



A-1296-A

NEW, FREE BULLETIN DETAILS ADVANTAGES

Ask the Modine representative listed in your classified phone book for Bulletin No. 755. Or write — MODINE MFG. CO., 1511 DeKoven Ave., Racine, Wis.

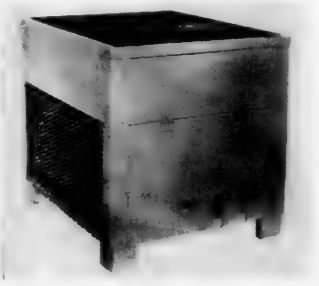
Modine Airditioners ✳

✳ TRADEMARK

(*Continued from page* 126)

Air Cooled Condensers

Straight air-cooled condensing units in 2-, 3- and 5-ton sizes are added by Coleman Co., Inc., Wichita, Kan., to its line of packaged remote air conditioning components. The units operate at the dry-bulb temperature of the air.



All three of the units have hermetically sealed compressors and copper coils with aluminum fins. A hinged door affords access to controls. The units are designed to be used with the Blend-Air line of direct expansion plenum coils and vertical coolers.

Cabinets are waterproofed, undercoated and finished in neutral tone Epon paint, which can be painted over to make the unit blend with surroundings. The smallest of the three models is 24 in. wide, 26½ in. deep, and 23¼ in. high.

The company recommends the air-cooled units for areas with relatively low cooling loads, low-cost electricity, and high relative humidity, or in situations where low initial cost is given preference over low operating cost.

More information? Circle Item 60 on postcard, page 101.

Spray Deodorizes Air

A deodorant that is sprayed into air conditioning ducts or registers or poured into the water system of warm air installations is marketed by Frank C. Keesecker, Dubuque, Iowa.

Made from natural oils and balsams, the liquid deodorant can be poured into the humidifying tanks that hang on the backs of steam or hot water radiators. It can also be sprayed with an atomizer which may be attached to the bottle. The deodorant is available in 1-quart bottles and in gallon jugs.

More information? Circle Item 61 on postcard, page 101.

Water Hammer Arrestor

Shock absorbers for arresting water hammer in hydraulic systems are introduced by J. A. Zurn Mfg. Co., Erie, Pa., under the name of Shoktrol.

Made of stabilized austenitic stainless steel, the shock absorbers contain a sealed-in air pressure charge in a metal bellows and are corrosion resistant. They are being produced in six sizes to provide protection against water hammer pressure in ½- to 2-in. diameters for varying pipe lengths and pressures. They have a diameter of 3 in. and range in height from 3¾ to 12 in.

The absorbers are designed for service where flow velocity is subject to sudden change, as in quick-closing, solenoid-actuated valves used with lavatories and sinks, dishwashers, automatic washers, and laundry equipment. They are also useful for improperly adjusted water closet flush valves, in pumping systems, and in drinking fountains or similar installations where the water flow is valved for intermittent operation.

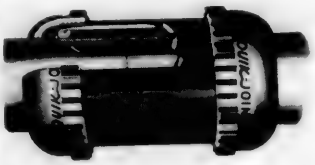
Pre-charged with air pressure, the bellows at the right remains in full, extended position under normal pressures. This makes its full capacity available at all times to relieve water hammer pressures. Also, the air charge eliminates the danger of contaminating the hydraulic system in case of unusual damage.

More information? Circle Item 62 on postcard, page 101.

Pipe Coupling

A pipe coupling is added to the line of valves and flexible couplings made by Guardian Products Corp., Michigan City, Ind.

Named Quik-Joint, the coupling is slipped over unthreaded ends of pipe and tightened with an ordinary pipe wrench. Close-tolerance pipe measurement is unnecessary and there are no exposed threads to corrode and weaken the pipe system.



The coupling can also be used to repair leaks by cutting the pipe at the leak and installing the coupling to join the two cut ends. The coupling withstands working pressures to 2000 psi.

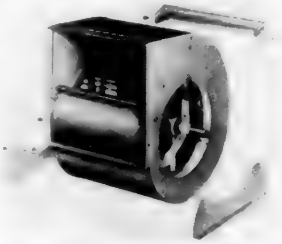
A bulletin describing the coupling and its applications is published by the company.

More information? Circle Item 63 on postcard, page 101.

Blower Mounts Four Ways

A blower with an interchangeable mounting is made by Utility Fan Corp., Los Angeles, Calif.

The interchangeable mounting feature of the blower, called IM-Pak, enables it to be switched to any of four positions while in production. This feature, together with a range of sizes from 9 to 16-in. inclusive, enables the blower to cover most of residential and commercial air moving applications.



The two housing supports and motor mount brackets are shipped unattached but with all hardware needed for rapid installation. It is a relatively simple operation to adjust the angle of discharge to any of four positions.

Though equipped with sealed ball bearings, the blowers are also available with an interchangeable sleeve bearing mount that is adjustable.

More information? Circle Item 64 on postcard, page 101.

(*Continued on page* 130)

AIR CONDITIONED TRIPOD

Texas Tower radar "Island" keeps cool with AIRTEMP Air Conditioning

Under a blazing summer sun, this offshore air defense Texas Tower radar "island" could literally *cook* the Air Force crews that man it. But not with Airtemp air conditioning on the job!

Cool, clean, healthful air, provided by packaged chiller units, helps keep radar crews alert...helps precision radar stay accurate. Thus, men and equipment alike perform efficiently in this vital link of our early warning network.

It's unusual air conditioning to be sure, but just a routine application for top engineers of Airtemp Construction Corporation. As air conditioning specialists, these men provide efficient systems for buildings, offices and stores of every kind.

Their experience, plus years-ahead engineering by Chrysler, assures dependable, trouble-free air conditioning through the years.

When *you* specify Airtemp, you help clients cut operating costs, attract new business, increase profit dollars. Let your Airtemp distributor give you the facts. Or, write: *Airtemp Construction Corp., Dept. AC-4-56, Dayton 1, Ohio.*

Airtemp
CONSTRUCTION
CORPORATION
SUBSIDIARY OF CHRYSLER CORP.

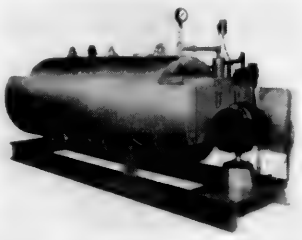
AIRTEMP BUILDS AIR CONDITIONING TO MEET EVERY REQUIREMENT

(*Continued from page* 123)

Low Pressure Steam Generator

A low pressure steam generator, available in six capacities ranging from 10 to 50 hp, is introduced by Atlantic Steel Boiler Co., Philadelphia, Pa.

The self-contained unit features a low water line, 99% assured dry steam (dry pan under outlet), 80% operating efficiency, and facilities for cleaning. It is built to ASME specifications.



The generator is designed to operate with natural draft; however, where the draft is deficient or where a large stack or chimney is not desirable, it is available with induced draft fans. The boilers are insulated with 1½-in. Fiberglas blankets and are enclosed in a steel, wrap-around jacket. The oil burner is fitted with an electronic control mounted in blast tube, a shell combustion head, and a delayed action valve; it is mounted, wired, and ready to be installed.

Shipped with the refractory in place, the unit is suitable for both steam and hot water applications and for process work where low pressure steam is required.

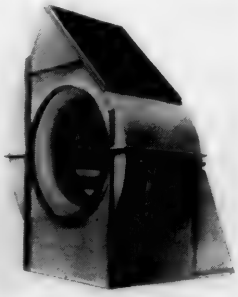
A data sheet for the generator is published by the manufacturer.

More information? Circle Item 65 on postcard, page 101.

Centrifugal Fans

Centrifugal fans, designed for commercial and industrial ventilating, air conditioning and heating applications, are available from Chicago Blower Corp., Franklin Park, Ill., for use wherever Class I or Class II fans meet requirements.

A range of wheel diameters is available in two types of wheels. The Type B centrifugal fan has a backward curved, flat-bladed wheel with non-overloading characteristics. The Type F has a forward curved, multibladed wheel for slow speed operation. Both types are available with direct or V-belt drives.



On the Type B wheel, the blades are welded to a steel back plate, to which has been welded a solid turned steel hub. On the larger size wheels, the hub is welded to a ⅜-in. thick back steel plate.

The Type F wheel utilizes a number of narrow curved blades which give a maximum velocity to the air leaving the blade tips. All blades are die-formed for uniformity and welded to a back plate, to which has been welded a solid turned steel hub. In the larger size wheels, the back plate is further strengthened by welding the hub to a ⅜-in. thick reinforcing plate and then welding this assembly to the back plate. The front or outer ring is also welded to each of the blades, forming an all-welded construction.

The fans are suitable for handling hot air and gases up to 600 deg F. They can be used for drying ovens, driers, and other industrial process applications.

Wheel diameters from 12¼ to 143 in. are made. Type B is made with volumes to 324,960 cfm and pressures to 6½ in. of water; Type F with volumes to 277,400 cfm and pressures to 5 in. of water.

More information? Circle Item 66 on postcard, page 101.

Plastic Protective Coating

A plastic coating for protecting or water proofing and preventing rust and corrosion is available from Thermo-Ryte Coating Co., Chicago, Ill. The coating is resistant to acids, alkalies, alcohols, oils, grease, caustic soda, soap, chloride, and hypochlorite.

Called TRC, the coating may be brushed, rolled, or sprayed on wood, metal, glass, brick, and concrete. No special preparation of the surface is necessary aside from ordinary cleaning.

The material will withstand outdoor weather conditions without cracking, crazing, or peeling. It resists moisture and may be applied to damp surfaces or at sub-zero temperatures. Being resilient, it protects and prevents destructive effects of freezing and thawing. It also resists mold and mildew in hot humid climates.

The coating comes in twenty basic colors and transparent. Special color matches can also be supplied.

More information? Circle Item 67 on postcard, page 101.

Valve Prevents Flooding

An hydraulic sewer valve is available in six standard capacities for 4, 5, 6, 8, 10, and 12-in. sewers from Protection Equipment Co., Minneapolis, Minn. Other sizes are also available on special order.

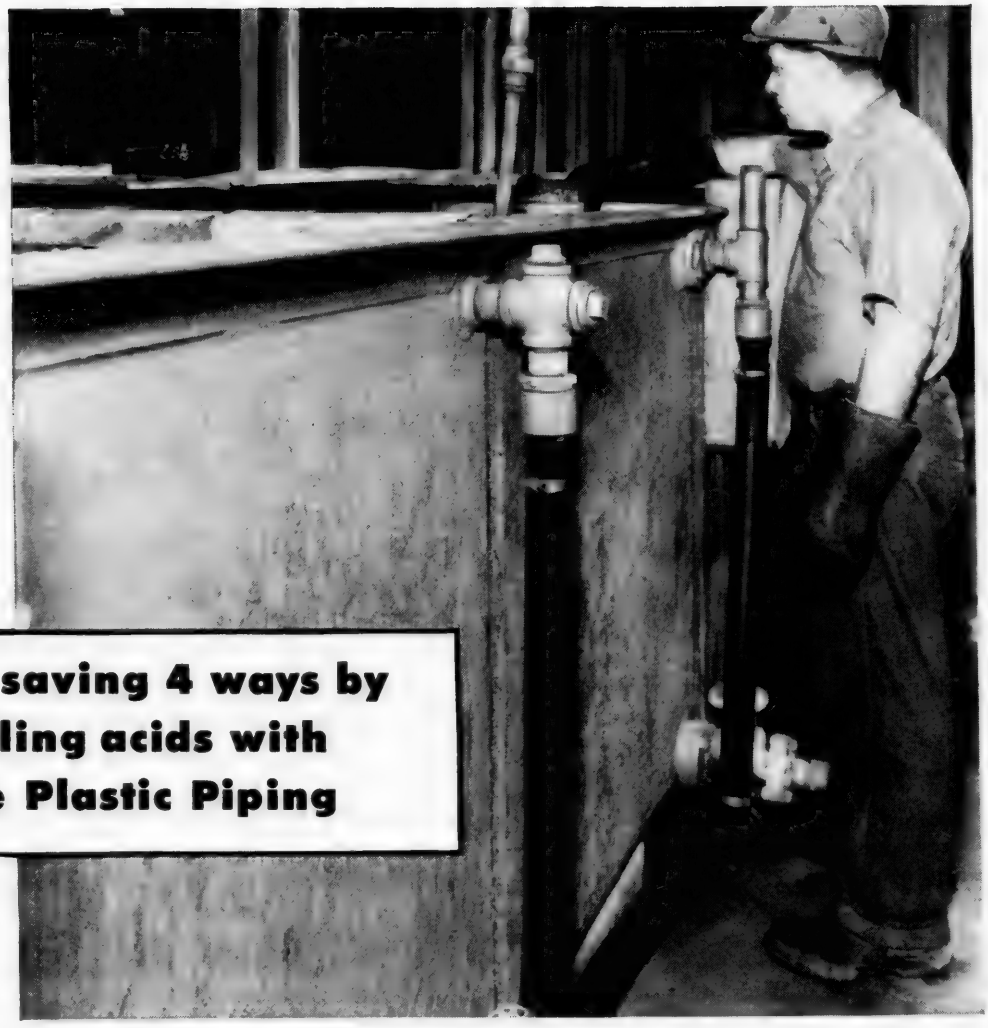
Named Storm Guard, the sewer valve automatically prevents main floor, basement, and low-level warehouse flooding when storms cause city sewer systems to back up. The valve is positive in action, closing with approximately two thousand pounds pressure to shear paper, wood, toothbrushes, and other materials that ordinarily cause valves to fail when needed most.

When the sewer level rises to the back-up danger point, a float in the valve rises. This float operates an arm which causes city water pressure to close the hydraulic shutoff valve. During a single storm the valve may automatically open and close several times. City water is used to operate the valve because it is the most dependable of all power during the time of a storm.

The valve is made for plants, hospitals, schools and other institutions, and commercial buildings where sewage backups may cause considerable damage.

More information? Circle Item 68 on postcard, page 101.

(*Continued on page* 132)



They're saving 4 ways by handling acids with Crane Plastic Piping

THE CASE HISTORY— Globe-Union Inc., leading storage battery builder, in its Milwaukee plant, might have decided plastic piping wasn't for them and let it go at that. Instead, they gave Crane plastic products a fair trial, and here are the results.

On hydrochloric acid lines to zinc-plating tanks, the metal pipe and fittings formerly used had to be replaced completely about every month. Corrosion was the cause.

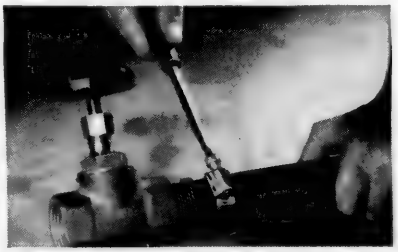
With Crane polyethylene pipe and Crane plastic fittings in this same service, after more than 3 months there is no sign of deterioration and no apparent need of early replacement.

On battery test tanks, Crane plastic piping, exposed to built-up sulphuric acid concentration, looks good as new after more than 4 months' service.

Savings with Crane plastic piping are adding up 4 ways. Plastic cancels the need for costlier metal pipe. It is installed in a fraction of the time it takes for metal pipe and fittings. It reduces installation to a one-man job with simple hand tools. The longer life of plastic is saving replacement, maintenance and housekeeping costs.

Proved in severest services, Crane plastic piping is giving Globe-Union equal satisfaction on many low-pressure air and water lines. Here freedom from sweating is another advantage of plastic.

Once you know the facts of quality-designed, quality-made Crane polyethylene pipe and Crane plastic insert fittings, you, too, will see many opportunities for saving with this modern piping. Call your local Crane Representative today, or write to address below.



Crane adapter makes plastic-to-metal joints easy

CRANE PLASTIC PIPING

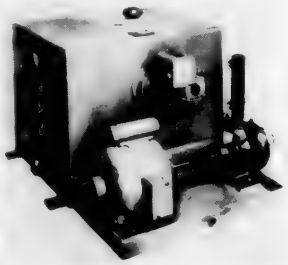
VALVES • FITTINGS • PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

(*Concluded from page* 130)

Small Condensate Return Pump

An all-bronze, centrifugal condensate return pump that does not require a pit, even though return pipes are no more than a foot above the floor, is offered by Walter H. Eagan Co., Inc., Philadelphia, Pa.



Called the Eagan Eagle, the pump handles any load up to 8000 sq ft at 20 psi. It features a non-clogging open impeller, a stainless steel shaft, life-sealed ball bearing, a flexible coupling, and flexible pipe connections which completely isolate the pump. The unit's ¼-hp capacity type motor has thermal overload protection.

The pump also has a level indicating, two pole switch, an 18½ gal, and a 3/16-in. thick steel receiver with a 1-in. vent and a ¾-in. drain. It has a capacity safety factor, providing for at least a 1-to-3 *on-off* operation cycle with reasonably tight traps. Similar models are available with capacities up to 100,000 sq ft at 200 psi.

More information? Circle Item 69 on postcard, page 101.

Portable Humidifier

A portable electric humidifier which uses up to three gallons of water per hour and puts 574 lb of moisture into the atmosphere every twenty-four hours has been developed by Lake Erie Heating Corp., Erie, Pa.

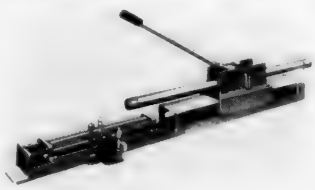
The price of the humidifier depends upon the filters and controls required and ordered. It has been designed to increase and control humidity in paper and printing plants, tobacco warehouses, spinning plants, greenhouses, and other places where moisture is a factor.

More information? Circle Item 70 on postcard, page 101.

Hydraulic Pipe Pusher

An hydraulically powered pipe pusher is offered by Mercury Hydraulics, Inc., Denver, Colo., with speeds up to 4 fpm for installing underground pipe.

Three models handle ¾ to 8-in. diameter pipe. The puller, called Speed-Thru, is operated by one man handling two power controls and features a 21-in. movement that will push or pull pipe at the same speed, without turning the position of the machine and without altering the power or changing speeds.



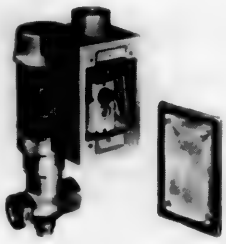
The device is portable and requires no hand labor except for placing it into pushing position. It is delivered as a complete unit, including the gas engine, d-c truck power, or an a-c electric hydraulic power unit, as desired. The units are complete with 25 ft of hydraulic pressure and return hoses equipped with quick couplers on the ends. Dust caps and dust plugs protect the coupling ends when not in use.

Descriptive literature on the pipe pusher is available.

More information? Circle Item 71 on postcard, page 101.

Timer Flow Control Valves

The flow of liquids, gases, or air can be controlled automatically by the timer valves available from Automatic Controls Corp., Ann Arbor, Mich. The units consist of a solenoid valve and a timer control sealed in a watertight case.



The timer valves turn the flow on or off at desired time intervals. They are available in a variety of timing cycles for a number of industrial applications. For example, the valves can be used to turn a flow either on or off, or both on and off, at a desired time. They can perform this function each day with repeat cycle operation—no resetting is needed. The timer valves can also be used to obtain continuously intermittent operation—that is, they can be set to open and close a valve a certain number of times per minute, hour, or day.

The valves fit standard pipes ⅜ in. and larger, and operate on 110- or 220- v, 60-cycle current.

Information and descriptive literature are published by the company.

More information? Circle Item 72 on postcard, page 101.

Coils Have Top Connections

A line of Platecoils featuring serpentine construction and connections at the top is available from Tranter Mfg., Inc., Platecoil Div., Lansing, Mich.

The units are heat transfer coils designed to replace pipe coils in industrial processes requiring the application or removal of heat. They consist of two embossed metal sheets welded together to provide a pre-formed channel for the flow of heating or cooling media.

The right-angle inlet and outlet fittings on the Style 50 coils make them suitable for use in open top tanks. They can be hung in position, with all threaded connections above the solution level, permitting quick removal for cleaning or inspection without draining the tank. The serpentine layout of the channel provides continuous, in-line flow of the heating or cooling media.

The Style 50 coil is available in 18- or 22-in. widths, and in lengths from 23 to 119 in. Its overall thickness is ⅞-in. Available metals are: cold rolled steel, stainless steel, and other alloys for corrosive solutions.

More information? Circle Item 73 on postcard, page 101.

Archbishop Thos. J. Walsh Homes. 13 buildings; 630 units.
Rev. William P. Hayes Homes. 11 buildings; 1458 units.
Otto E. Kertchner Homes. 8 buildings; 730 units.

Thousands of MARSH Valves and Traps for this big Newark project!

A bright spot in the dark clouds that overhang Humanity is America's big drive to solve the housing problems of congested cities.

The development pictured here is in Newark. It consists of four projects, comprising a total of 41 big buildings containing more than 20,000 rooms. The four developments provide about five rooms each for over 4,000 families—enough dwelling units to house the entire population of a city of nearly 20,000 people.

Naturally, in buildings like these it is necessary for the sake of initial economy to rule out frills and embellishments. But never forget that the vital need for long-range economy dictates *highest quality in every basic element of construction.*

That is why only the best heating equipment is used in the four big central heating systems. That is why the systems are equipped throughout with thousands of Marsh Radiator Valves and Traps—the kind that will stand up across the years.

Yes, in buildings of every size and kind you will find Marsh Valves, Traps and Vents . . . selected by men who know the economy of using only the best. Let the Marsh man work with you on your next job.

MARSH HEATING EQUIPMENT CO. *Sales affiliate of Jas. P. Marsh Corporation* Dept. U, Skokie, Ill.

Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd St., Edmonton, Alberta

Newark's big scale housing

The four projects—three of them completed and fully tenanted—provide homes for 4,374 families in the 20,681 rooms of 18 12-story; 13 8-story, 1 7-story, and 5 3-story buildings. The project is described as:

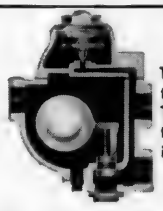
Housing Authority,
City of Newark, N. J.
David Kent, Dir. of Development
Louis Danzig, Exec. Dir.
Steve Galaida, Mechanical Engineer

The projects are:

1. Otto E. Kertchner Homes
   General Contractor: HRH Construction Co., New York, N. Y.
   Heating Contractor: John H. Joyce, Newark, N. J.
2. Archbishop Thos. J. Walsh Homes
   General Contractor: Terminal Construction Co., Wood Ridge, N. J.
   Heating Contractor: John Cooney, Harrison, N. J.
3. Rev. William P. Hayes Homes
   General Contractor: Terminal Construction Co., Wood Ridge, N. J.
   Heating Contractor: Paramount Plbg. & Htg. Corp., New York, N. Y.
4. Christopher Columbus Homes
   General Contractor: Terminal Construction Co., Wood Ridge, N. J.
   Heating Contractor: Paramount Plbg. & Htg. Corp., New York, N. Y.

The Christopher Columbus group of 8 12-story buildings is not illustrated, but is now completed.

The great combination: Marsh packless—*truly packless*—radiator valve and the trouble-free Marsh thermostatic trap.



The Marsh float and thermostatic trap. There is a Marsh trap for every heating service.

MARSH *Quality Heating Specialties* **SINCE 1865**

DEGREE-DAYS FOR FEBRUARY, 1956

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city.

AIR CONDITIONING, HEATING AND VENTILATING's 28th Year of Publication of Monthly Degree-Day Data

City	February			Season to end of February, incl.*		
	1956	1955	Normal	1955-56	1954-55	Normal
Abilene, Texas (A)	511	471	479	2205	1918	2250
Albany, New York (A)	1123	1128	1179	5161	4885	5056
Albuquerque, New Mexico (A)	836	840	714	3064	3327	3441
Alpena, Michigan (C)	1220	1216	1263	5442	5244	5448
Anaconda, Montana (C)	1265	1248	1164**	5973	5412	5656**
Asheville, North Carolina (C)	584	668	678	3254	3358	3105
Atlanta, Georgia (A)	396	480	512	2355	2391	2269
Atlantic City, New Jersey (C)	741	849	829	3450	3414	3331
Augusta, Georgia (A)	335	412	412	2162	2207	1768
Baltimore, Maryland (C)	679	763	776	3331	3242	3193
Billings, Montana (A)	1155	1243	1089	5622	4665	5133
Binghamton, New York (C)	1041	1067	1100	4832	4653	4735
Birmingham, Alabama (A)	366	461	491	2327	2348	2252
Bismarck, North Dakota (A)	1618	1586	1464	7552	6096	6652
Block Island, Rhode Island (A)	904	904	955	3998	3754	3917
Boise, Idaho (A)	1085	1052	868	4397	4605	4377
Boston, Massachusetts (A)	936	917	1002	4251	3952	4123
Bozeman, Montana (C)	1267	1269	1208**	6065	5551	5897**
Buffalo, New York (A)	1061	1032	1128	4795	4571	4777
Burlington, Iowa (A)	1077	1060	1036	4909	4506	4641
Burlington, Vermont (A)	1209	1252	1313	5647	5501	5632
Butte, Montana (C)	1343	1298	1143**	6348	5797	5635**
Cairo, Illinois (C)	614	681	683	3163	2966	3004
Charleston, South Carolina (C)	228	360	363	1560	1622	1466
Charlotte, North Carolina (A)	490	532	577	2573	2641	2555
Chattanooga, Tennessee (A)	465	550	588	2804	2815	2693
Cheyenne, Wyoming (A)	1222	1165	1044	5101	4805	5109
Chicago, Illinois (C)	984	980	1039**	4319	4115	4401**
Cincinnati, Ohio (C)	702	748	812	3483	3372	3465
Cleveland, Ohio (A)	967	950	1019	4402	4173	4322
Columbia, Missouri (A)	882	890	876	4045	3683	3934
Columbia, South Carolina (A)	370	444	443	2212	2296	1889
Columbus, Ohio (C)	840	872	907	4089	3847	3953
Concord, New Hampshire (A)	1144	1091	1226	5375	5086	5457
Concordia, Kansas (C)	1019	1105	899	4528	3925	4091
Dallas, Texas (A)	434	451	432	2000	1818	1909
Dayton, Ohio (A)	894	929	941	4326	4141	4157
Deer Lodge, Montana (C)	1300	1256	1175**	6233	5828	6069**
Denver, Colorado (A)	1072	1054	924	4257	4233	4397
Des Moines, Iowa (A)	1137	1195	1092	5297	4744	4877
Detroit, Michigan (A)	1061	1018	1072	4611	4428	4600
Devils Lake, North Dakota (C)	1739	1671	1576	8066	6730	7237
Dodge City, Kansas (A)	976	976	840	4026	3615	3867
Dubuque, Iowa (A)	1235	1230	1187	5606	5243	5366
Duluth, Minnesota (C)	1530	1491	1448	7001	6520	6677
Elkins, West Virginia (A)	783	879	910	4444	4437	4182
El Paso, Texas (A)	578	543	445	1874	2173	2201
Ely, Nevada (A)	1312	1313	1033	5251	5692	5199
Escanaba, Michigan (C)	1308	1293	1327	5745	5482	5756
Evansville, Indiana (A)	703	770	939	3662	3483	3424
Fargo, North Dakota	1714	1655	1518	7526	6537	6851
Fort Smith, Arkansas (A)	585	624	571	2844	2595	2619
Fort Wayne, Indiana (A)	1020	997	1036	4690	4417	4601
Fort Worth, Texas (A)	445	455	446	2034	1852	1958
Fresno, California (A)	558	495	400	2010	2315	2040
Galveston, Texas (C)	188	247	247	877	839	1005
Grand Junction, Colorado (A)	982	1213	924	3952	4691	4488
Grand Rapids, Michigan (A)	1166	1107	1154	5011	4772	5033
Green Bay, Wisconsin (A)	1369	1335	1336	6002	5736	5887
Greensboro, North Carolina (A)	617	655	672	3167	3177	2991
Greenville, South Carolina (A)	503	545	552	2587	2638	2425
Harrisburg, Pennsylvania (A)	850	914	921	4031	3943	3943
Hartford, Connecticut (A)	971	961	1050	4554	5422	4494
Hatteras, North Carolina (C)	413	549	487	2171	2091	1802
Havre, Montana (C)	1436	1318	1291	7086	5283	6044
Helena, Montana (A)	1344	1234	1165	6483	5651	5881
Houston, Texas (C)	209	258	240	991	959	1083
Huron, South Dakota (A)	1618	1489	1327	6962	5690	1327
Indianapolis, Indiana (A)	906	911	938	4360	4132	4201
Jackson, Mississippi (A)	314	425	405	1986	1945	1822
Kansas City, Missouri (A)	877	931	851	3980	3529	3811
Knoxville, Tennessee (A)	507	600	630	2991	3000	2844
La Crosse, Wisconsin (A)	1371	1305	1280	6014	5457	5708

(a) Data not available.

*Heating season cumulative, from Sept. 1.

**Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

Figures in this table, with eight exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Busar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company. Tacoma figures through the courtesy of the Tacoma News Tribune.

[Table concluded on page 136]

This "OGRE" can ruin a hot underground piping system that is turned on and off!
Let's look beyond just the initial cost of installing an underground piping system!
Consider for a moment how this system, once installed, will react to the thermal shock of turning it on and off (and what system isn't turned on and off occasionally). Unless the system is inherently capable of withstanding the shock of on and off service . . . that's when the "Ogre of Corrosion" swiftly becomes a real threat . . . and it costs you money!
Ask your Ric-wiL representative to explain how a Ric-wiL system protects you against on and off thermal shock.
Write for the NEW Ric-wiL Catalog or phone your Ric-wiL representative for a copy.
RIC-WIL
Quality Piping Systems . . .
. . . of Exceptionally High Thermal Efficiency
RIC·WIL INCORPORATED
PREFABRICATED INSULATED PIPING SYSTEMS
BARBERTON, OHIO
Representatives in Principal Cities

Degree-Days for February, 1956 (Concluded)

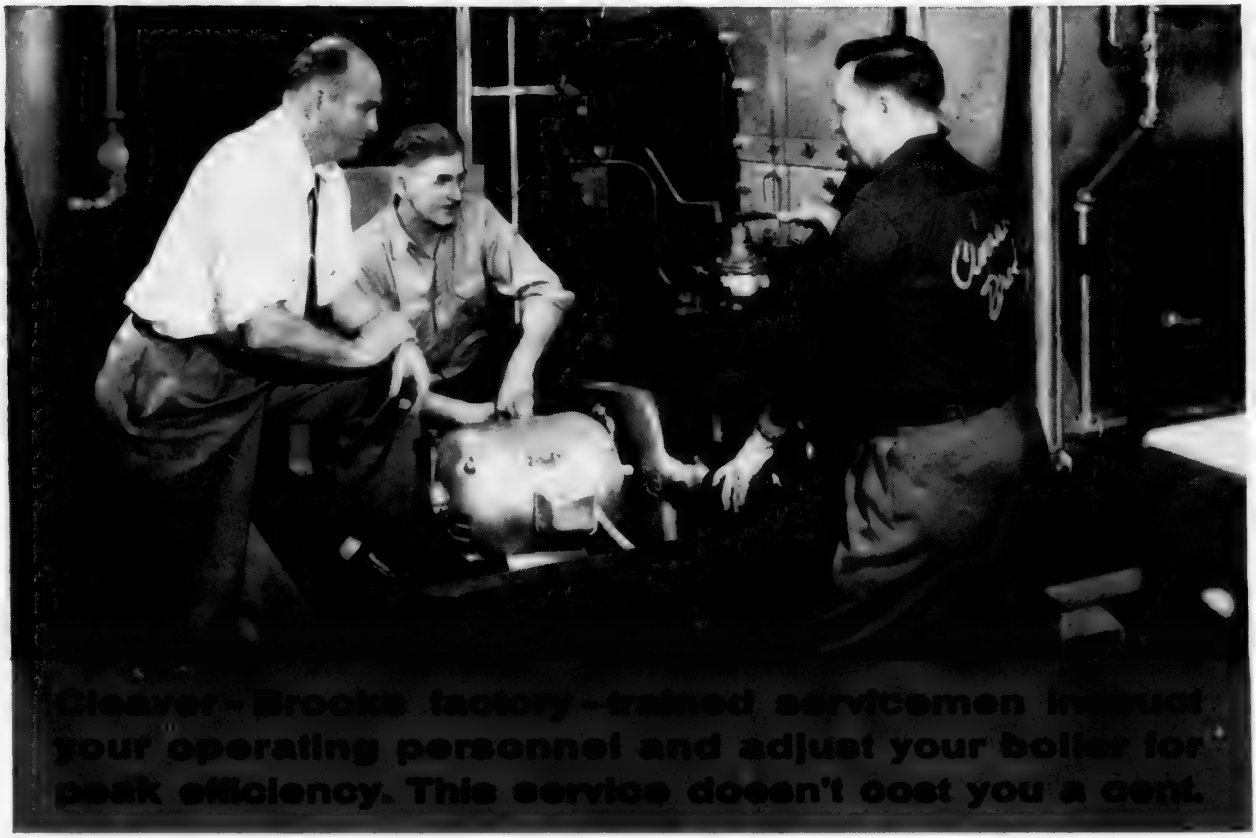
(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 28th Year of Publication of Monthly Degree-Day Data

City	February			Season to end of February, incl.*		
	1956	1955	Normal	1955-56	1954-55	Normal
Lander, Wyoming (A)	1391	1290	1179	5852	5322	5982
Lewiston, Maine (O)	1141	1139	1243	5147	5158	5532
Lincoln, Nebraska (C)	1083	1182	1000	4866	4357	4483
Little Rock, Arkansas (A)	506	570	543	2553	2399	2441
Livingston, Montana (C)	1103	1151	1067**	5357	5009	5018**
Los Angeles, California (C)	338	223	244	1096	892	1023
Louisville, Kentucky (A)	680	760	778	3485	3440	3444
Lynchburg, Virginia (A)	667	711	722	3359	3376	3193
Macon, Georgia (A)	288	353	391	1886	1914	1712
Madison, Wisconsin (C)	1215	1220	1207	5439	5173	5331
Marquette, Michigan (C)	1229	1248	1291	5672	5511	5737
Memphis, Tennessee (A)	492	581	574	2638	2566	2547
Meridian, Mississippi (A)	304	417	413	2027	2082	1930
Milwaukee, Wisconsin (A)	1153	1122	1142	5111	4817	5089
Minneapolis, Minnesota (A)	1444	1411	1310	6422	5746	5862
Moline, Illinois (A)	1096	1107	1075	5001	4719	4797
Montgomery, Alabama (A)	268	375	388	1890	1974	1769
Nantucket, Massachusetts (A)	(a)	904	949	(a)	3809	3991
Nashville, Tennessee (A)	518	647	636	2986	2975	2786
New Haven, Connecticut (A)	927	938	1005	4255	4069	4263
New Orleans, Louisiana (C)	145	191	223	1040	974	993
New York, New York (C)	814	841	904	3717	3629	3670
Newark, New Jersey (A)	833	857	932	3835	3716	3883
Norfolk, Virginia (A)	546	662	644	2770	2800	2630
North Platte, Nebraska (A)	1147	1254	1016	5441	5009	4851
Oak Ridge, Tennessee (C)	498	644	689	3126	3184	3110
Oakland, California (A)	699	461	400	2250	2084	2029
Oklahoma City, Oklahoma (A)	699	698	630	3177	2774	2840
Omaha, Nebraska (A)	1121	1230	1058	5093	4467	4728
Parkersburg, West Virginia (C)	737	(a)	826	3750	(a)	3599
Peoria, Illinois (A)	1014	1030	1028	4661	4393	4580
Philadelphia, Pennsylvania (C)	764	788	837	3451	3387	3394
Phoenix, Arizona (A)	402	390	275	1132	1279	1255
Pittsburgh, Pennsylvania (C)	808	829	879	3869	3771	3761
Pittsfield, Mass. (A)	1165	1123	1308	5528	5245	5106
Pocatello, Idaho (A)	1308	1225	1022	5106	5556	5082
Portland, Maine (A)	1166	1065	1218	5383	5004	5367
Portland, Oregon (C)	793	641	594	3259	2842	2985
Providence, Rhode Island (A)	941	931	1019	4379	4106	4339
Pueblo, Colorado (A)	1070	1038	865	4188	4007	4248
Raleigh, North Carolina (A)	548	590	577	2896	2891	2434
Rapid City, South Dakota (A)	1180	1274	1151	5607	4882	5314
Reading, Pennsylvania (C)	815	857	902	3828	3746	3785
Red Bluff, California (A)	538	485	423	2054	2279	1982
Reno, Nevada (A)	1077	916	804	4333	4548	4190
Richmond, Virginia (A)	631	690	708	3205	3200	3068
Rochester, New York (A)	1101	1092	1148	4985	4743	4870
Roswell, New Mexico (A)	795	663	566	2824	2814	2768
Sacramento, California (C)	486	453	403	1866	2236	1997
St. Joseph, Missouri (A)	978	1101	820	4528	4095	3646
St. Louis, Missouri (C)	776	794	792	3649	3388	3478
Salt Lake City, Utah (A)	1115	1142	885	4248	4689	4358
San Antonio, Texas (A)	275	263	293	1295	1045	1355
San Diego, California (A)	327	260	247	1062	902	1042
Sandusky, Ohio (C)	979	952	997	4392	4114	4235
San Francisco, California (C)	390	350	336	1787	1803	1679
Sault Ste. Marie, Michigan (A)	1348	1357	1442	6224	5999	6369
Savannah, Georgia (A)	205	324	330	1650	1795	1429
Scranton, Pennsylvania (A)	1007	987	1028	4792	4406	4423
Seattle, Washington (C)	768	657	602	3457	2877	3037
Sheridan, Wyoming (A)	1256	1260	1170	5867	5077	5607
Shreveport, Louisiana (A)	319	428	386	1811	1759	1784
Sioux City, Iowa (A)	1251	1336	1170	5699	4971	5301
Spokane, Washington (A)	1223	1053	988	5404	4794	4936
Springfield, Illinois (A)	953	933	907	4429	4066	4021
Springfield, Missouri (A)	775	829	790	3752	3457	3624
Syracuse, New York (A)	1095	1099	1117	5007	4791	4682
Tacoma, Washington (C)	813	683	636	3537	3020	3283
Toledo, Ohio (A)	1040	1004	1046	4877	4438	4617
Topeka, Kansas (C)	898	1011	851	4163	3699	3830
Trenton, New Jersey (C)	806	843	904	3807	3715	3760
Tulsa, Oklahoma (A)	653	665	644	3062	2637	2882
Utica, New York (O)	1127	1137	1181**	5196	5127	4966**
Valentine, Nebraska (A)	1318	1324	1100	5929	4989	5170
Walla Walla, Washington (C)	1062	752	748	4277	3521	3737
Washington, D. C. (C)	677	747	770	3309	3290	3258
Wichita, Kansas (A)	851	911	778	3858	3388	3564
Williston, North Dakota (C)	1516	1561	1442	7388	5988	6642
Winnemucca, Nevada (A)	1047	1056	854	4617	5252	4602
Yakima, Washington (A)	1218	843	862	5315	4308	4512

For footnotes, see page 134.

A good start is a sure way
to maintain highest boiler efficiency


Cleaver-Brooks factory-trained servicemen instruct
your operating personnel and adjust your boiler for
peak efficiency. This service doesn't cost you a cent.

OTTO POLZIN is a typical Cleaver-Brooks factory-trained serviceman. He is shown on the job at Oilgear Co., Milwaukee, where he has just given two 125-hp Cleaver-Brooks boilers an initial start. Norbert Husting and Gordon Knischke of Oilgear are getting all the details on boiler operation and maintenance, including boiler blow-down procedure and tube cleaning.

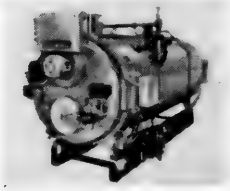
While on his "starting service call", Otto covered all of 32 items on his check list — such as the entire lubrication system, a CO_2 reading, inspected and cleaned relay points. In short, he *personally* made sure both boilers were "tuned" to perfection!

Cleaver-Brooks service is nationwide

This service is "standard practice" everytime a Cleaver-Brooks boiler is put into operation. And, as thousands of owners know, a phone call to your local Cleaver-Brooks representative brings this and other specialized services when needed.

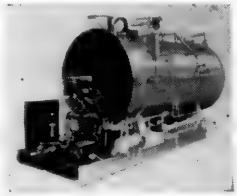
Factory-supervised starting is just one of many advantages of being a Cleaver-Brooks boiler owner. You get the ultimate in modern boiler design: forced draft with four-pass construction, hinged or davited front and rear doors for fast cleaning, 10-second gas or oil interchange — just to name a few features.

Get the full story on the complete line — sizes from 15 to 600 hp; 15 to 250 psi. Call your nearby Cleaver-Brooks representative or write direct. Cleaver-Brooks Company, Dept. D, 31 E. Keefe Ave., Milwaukee 12, Wisconsin, U.S.A. Cable Address: CEEBEEWEST — all codes. Ask for catalog AD-137.



MODEL CB — Most silent-running boiler on the market. Ideal for schools, hospitals. Sizes: 15 to 150 hp.

MODEL LR — Standard of the industry for steam or hot water service in heating or processing applications. Sizes: 200 to 600 hp.



Cleaver Brooks®

TWENTY-FIVE YEARS OF LEADERSHIP
BY THE ORIGINATORS OF THE SELF-CONTAINED BOILER

NEWS OF THE MONTH

DUCT STEEL

is being galvanized by continuous, hot-dip process in new mill, which operates for 13 weeks continuously.

A production line for galvanizing steel by a continuous, hot-dip process called Armco-Sendzimir has been started by Jones & Laughlin Steel Corp., Pittsburgh, Pa. With a rated capacity of 7000 to 8000 tons per month, the new facility was constructed at a cost of $6,250,000 as a part of the company's improvement and expansion program.

The process being used by the company was developed in 1936 by Tadeusz Sendzimir, a Polish engineer, but it remained in an experimental stage for a number of years afterward. The patents covering the process were granted to Sendzimir in 1938 and 1940 and are controlled by Armco Steel Corp.

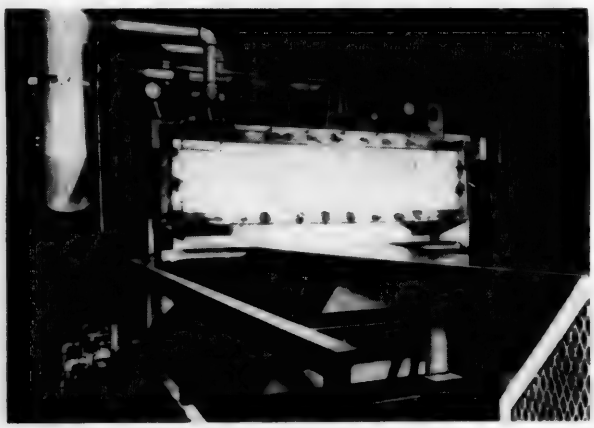
• **COATING PROCESS.**—In the Sendzimir coating process, the surface of the base metal is oxidized to remove rolling lubricants and other combustible material. The oxidation is performed by passing the strip continuously through a furnace.

After the initial oxidation, the strip then passes into another furnace where the metal is annealed. A second furnace, at a lower temperature than the first, is connected directly to the annealing furnace and extends to the zinc bath with its end sealed by molten zinc. This second furnace controls the rate of cooling of the strip in a non-oxidizing atmosphere. Dissociated anhydrous ammonia serves as a reducing atmosphere in the annealing furnace and as a non-oxidizing atmosphere in the second, or *cooling* furnace.

The annealing and *cooling* furnace combination is air-tight, because the entrance of any oxygen would result in re-oxidizing the strip and spoiling its wetting.

The strip is immersed in a flux-free, molten zinc bath, where wetting and bonding occur instantaneously. A rapid reaction between the zinc and the base metal takes place.

• **MILL OPERATION.**—Housed in an L-shaped building, the production line will operate for thirteen weeks continuously before it is shut down for drossing (removing the wastes from the bottom of the pot) and maintenance. The galvanizing department's raw material, in the form of cold-rolled steel bands, is delivered from an adjoining continuous sheet mill.



Surface oils on the sheet steel are removed by oxidation in the flame heating furnace on the new continuous galvanizing line.

Warehouse helpers ready a lift of the galvanized sheets for shipment. The sheets are banded in packages for customers.

The line is 610 ft long, overall. The oxidizing furnace is 20 ft long, the reducing furnace 104 ft long, and the controlled *cooling* furnace 224 ft long. The building is 750 ft long and 100 to 175 ft wide.

The mill was built by Aetna-Standard Engineering Company, the prime contractor on the project. They contracted the installation of the mill to Eichleay Corporation; erection of the building and installation of electrical equipment to Patterson-Emerson-Comstock, Inc.; and the design and installation of the furnaces to the Electric Furnace Company. General Electric Company furnished all the drive and control equipment.

NON-RESIDENTIAL BUILDING CODE

promulgated for New York State. Code admits new techniques and materials. Manual lists requirements.

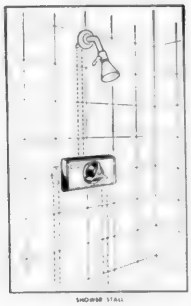
Promulgation of the New York State Building Construction Code applicable to commercial, industrial, institutional, and other non-residential building construction was announced by the State Building Code Commission. The state's requirements for general building construction complement those previously published which are applicable to residential buildings.

The new regulations go into effect on May 1 in the 181 municipalities—21 cities, 65 towns, and 95 villages—which have already accepted applicability of the code on a voluntary basis by local legislative action.

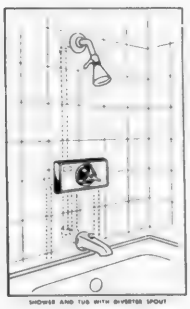
"The availability of complete uniform building regulations to all municipalities of the state desiring them is an important step in bringing order out of the chaos which has attended local building code enforcement in this state for half a century," Brig. Gen. Edward J. McGrew, Jr., chairman of the commission, stated.

(*Continued on page* 140)

More POWERS to You for BETTER Showers



HYDROGUARD has a built-in shut-off valve therefore none is required between it and the shower head.

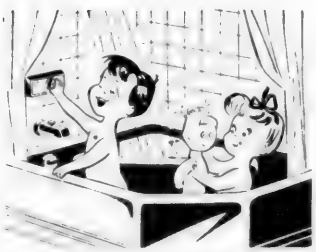


For Happier Customers and Bigger Profits

Install POWERS *New* Hydroguard®

–the finest **thermostatic** shower control made for homes, clubs, schools, hotels and hospitals

Here's Why Hydroguard Has More SALES Appeal



Don't Skimp on Safety in Showers

More Convenient—there's only ONE dial to turn. Note uncluttered simplicity of installations above. Powers Triple duty Strainer-Check-Stops concealed behind the HYDROGUARD cover, simplify piping and tile work. Walls are unmarred by protruding knobs or 2 to 4 valve handles. There's no confusion.

You Can Really Enjoy Worry-Free Bathing in perfect comfort in a HYDROGUARD shower. Temperature stays where you set it regardless of *pressure* or *temperature* changes in water supply.

Thermostatic SAFETY-LIMIT Protects Children from Scalding. It prevents flow of water to shower or tub above 110°F. If cold water supply fails HYDROGUARD instantly shuts off the shower.

HYDROGUARD
Is Nationally Advertised

(c63)

Phone or Write our nearest office for Bulletin 366 and Prices

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 Years of Leadership in Water Temperature Control

NON-RESIDENTIAL BUILDING CODE

(*Continued from page* 138)

• **NEW TECHNIQUES CITED.**—"The extraordinary advances being made in building and construction technology impose new considerations in code interpretation and enforcement.

"The commission's code is prepared in performance terms which are sufficiently broad to allow for admission of new techniques and materials without requiring constant amendment of the regulations themselves," he stated.

The commission conferred with architects, engineers, and specialists in various phases of building, construction, fire safety and sanitation in the preparation of the regulations. In addition, it had the counsel of about sixty national and statewide research and technical organizations in drafting the rules, public hearings on which were held in Albany and New York City in December.

• **SERVICES TO MUNICIPALITIES.**—In addition to the complete building regulations, the commission provides municipalities administering the state code with a manual, detailing typical permissible methods of meeting the code requirements. It has established a standard procedure for introduction of new materials, equipment and methods of construction, and acts as a central clearinghouse for test data prepared expressly for the commission or furnished by accredited laboratories and authoritative organizations.

• **STANDARDS PUBLISHED.**—The commission has also published a list of generally accepted engineering standards applicable to the state code. Under the State Building Code Law, construction in accordance with these standards, except where modified by the detailed regulations spelled out in the code, is deemed to meet the requirements of the code.

HEATING AND COOLING LOSSES

through doorways to be studied by research group. Project to include both laboratory and field tests.

Winter heating and summer cooling lost through building entrances is the subject of a new research project by the American Society of Heating and Air Conditioning Engineers.

Announced by Prof. Burgess H. Jennings, chairman of the Society's Committee on Research, the program will be conducted at the ASHAE research laboratory in Cleveland by Lester F. Schutrum, research supervisor, and T. C. Min, research engineer, under the guidance of the Technical Advisory Committee on Heating and Air Conditioning Loads.

According to Elmer R. Kaiser, ASHAE director of research, it is expected that the results of the program will be of particular importance to manufacturers of doors, building owners and managers, and heating, ventilating, and air conditioning engineers.

• **TWO-PHASE PROGRAM.**—Mr. Kaiser explained that the program, which will require a minimum of two years, is to be conducted in two phases involving laboratory work and field tests in a number of cities.

The field tests will be made to record the traffic through entrances of various types of buildings at different times of the day, including peak rush hours. Large and small, multi-story, and one-story buildings will be tested. Motion picture cameras and indicators above the doors will be used to record the precise amount of door opening at each fraction of a second. Simultaneously, instruments will measure the pressure differences across the entrances, because the amount of door opening has been found to change the stack effect.

The measurement of air flow cannot be done easily in the field, continued Mr. Kaiser, and for this reason the tests will be confined to a wind tunnel in the laboratory. This will permit accurate measurements of air flow, which can then be related to that experienced with actual building entrances. The model tests will include single doors, multiple doors, and vestibules in combinations.

With the information from the field and laboratory tests compiled in suitable tables, practical estimates of air flow under various conditions will be possible.

WATER VAPOR CONCENTRATIONS

can be measured in gases automatically. Instrument to monitor natural gas is based on heat exchanges.

The recent development of a continuous, automatic method and instrument for recording low concentrations of water vapor in air or gas streams now appears to offer a solution to moisture problems in process industries and gas pipelines.

Developed by the research and engineering departments of Mine Safety Appliances Co., Pittsburgh, and Esso Research and Engineering Co., the new method, operating on 4-min. measuring cycles, has been used in instruments with a full scale range of 100 ppm water by volume. It now appears possible to operate satisfactorily with even lower full scale ranges. Instruments can be made which will record higher ranges. A sensitivity of 0.25 ppm by volume has been attained. Accuracy is limited by noise level and calibration errors to about 1 ppm.

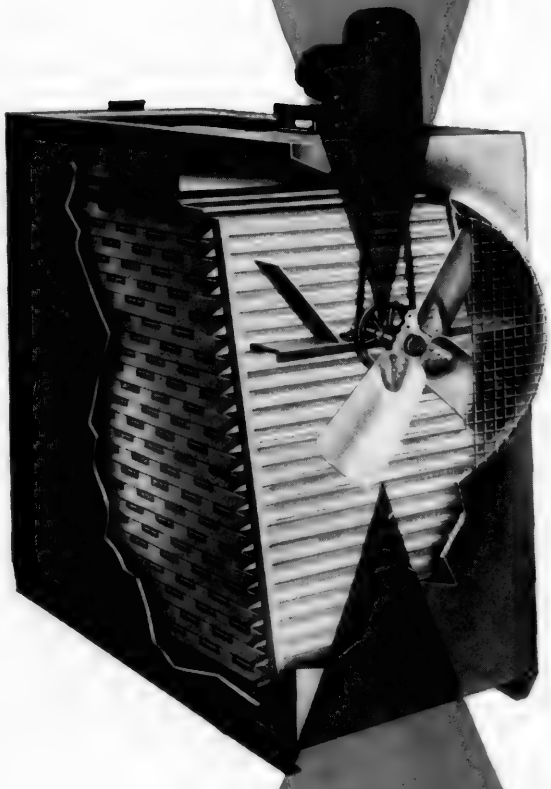
• **USE IN GAS LINES.**—In its first applications, the instrument is expected to be particularly valuable in monitoring the dryness of natural gas in long pipelines, according to John P. Strange, MSA chief physicist who described the instrument recently to the Instrument Society of America. The instrument will provide a means of monitoring gas so that the conditions under which hydrates form can be avoided. Also, the efficiency of drying towers can be maintained if the water content of the effluent gas is closely monitored so that regeneration is applied before, or at the time of, the first water break-through. Similarly it can be used to prevent moisture damage to certain process catalysts by monitoring the feed streams.

It is expected to be useful as a means of gathering accurate data upon which to base water tolerance limits. This has been hampered in the past by the lack of sensitive and reliable automatic instrumentation. The principle of operation is based upon the heat exchanged when a gas is adsorbed on or desorbed from a solid adsorbent.

(*Continued on page* 142)

So Halstead & Mitchell engineers said:

'THIS HAS A BEARING ON COOLING TOWER PERFORMANCE'



Nothing has more bearing on cooling tower performance and life than do tower fan bearings. On them turn the induced draft cooling tower's *only moving parts.*

Announcement by Halstead & Mitchell engineers of a *permanently* sealed and lubricated fan bearing means a bearing so designed as to completely eliminate moisture —and consequent rusting of the bearing balls and races. The *elimination of periodic greasing* cuts your tower maintenance costs to an absolute minimum . . . literally adds years to cooling tower life.

With not a single bearing failure reported from the hundreds of these "new bearing" towers in actual use, Halstead & Mitchell offers you . . . now more than ever . . . the best buy in cooling towers on the market today

SUPER-QUIET, 4-BLADE FANS, TOO!

There are new fans, too, on Halstead & Mitchell Cooling Towers—deep-pitch fans which operate at much, much lower speeds—actually *cut cooling tower noise level in half.* Sturdy, stainless steel fan blades . . . stainless steel fan shafts . . . make sure your tower will have not only a quiet life, but a long one, too!

For Complete Details, Write for Bulletin CT-584

20-Year Guarantee!

on the wetted deck surface against rotting or fungus attack **is an extra given you only by Halstead & Mitchell. Combined with the H & M *Protected* Steel concept, it offers unsurpassed protection against water and weather.**

H & M COOLING TOWERS ARE AT LEADING WHOLESALERS EVERYWHERE

HM

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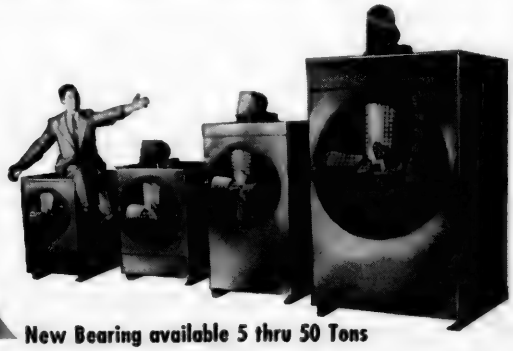
BESSEMER BUILDING, PITTSBURGH 22, PA.



New Bearing available 5 thru 50 Tons

WATER VAPOR CONCENTRATIONS

(*Continued from page* 140)

• **PRINCIPLE OF OPERATION.**—A continuously flowing sample of gas is split into two equal streams, one of which is dried completely by a regenerative adsorption column. The two streams are then directed alternately through two sides of a detector cell by means of automatically timed and operated three-way valves. During 4-min cycles the desiccant in each side of the cell is exposed alternately to each stream for 2 min.

A number of thermocouples in the two desiccant beds are connected in a circuit to develop an electrical potential. Since both adsorption and desorption processes proceed simultaneously, the resulting emf is proportional to the algebraic sum of the gain of heat on one side of the cell and the loss of heat on the other side. During each half cycle, the temperature differential in the cell rises rapidly, passes through a maximum and then diminishes slowly. When the maximum is passed, the flow is switched, and the moisture and temperature equilibration process is repeated. In the second half cycle, the desiccant and stream, which had lost heat in the previous half cycle. gain heat. and the reverse process takes place in the other side of the cell. The emf generated is equal, but of opposite polarity, to that of the previous half cycle.

SEMI-ANNUAL ASHAE MEETING

will be held in Washington. Papers and symposiums are selected. Committee appointments are made.

The 1956 semi-annual meeting of the American Society of Heating and Air Conditioning Engineers will be held June 18, 19, and 20 in the Shoreham Hotel, Washington, D. C. It will consist of seven sessions beginning on Monday and closing Wednesday evening with a banquet.

The Society's Program and Papers Committee, Walter A. Grant, Syracuse, N. Y., chairman, has tentatively selected fourteen papers and two symposiums and the Washington, D. C. Committee on Arrangements, Paul R. Achenbach, general chairman, has already completed preliminary plans for various special events.

• **PRESENTATIONS.**—Some of the fourteen technical papers to be presented will represent thoughts on such subjects as indirect water heaters, snow melting systems, solar energy, intermittent heating and cooling, and temperature and humidity effects on odor perception.

A symposium on codes and standards will be conducted by Charles H. Pesterfield, a professor of Michigan State College. The subject of the other symposium will be residential air conditioning and this will be conducted by Mr. Grant, who is vice president of Carrier Corp.'s central engineering staff.

• **APPOINTMENTS.**—The following appointments to the Committee on Arrangements have been announced by Mr. Achenbach: Vice General Chairman, William C. Reamy; Reception Committee, John G. Muirheid; Transportation Committee, S. Rushmore Allen; Entertainment Committee. Joseph H. Broome; Banquet Committee, Fred A. Leser; Ladies' Committee, Mrs. Joseph H. Broome; Publicity Committee, Beverly P. Evans; Finance Committee, Albert S. Gates, Jr.; Sports Committee, Francis E. McArdle; and Sessions Committee, Gunnar C. F. Asker.

HEATING-COOLING CAMPAIGN

is launched to promote water-fed systems. Directed at public and trade, drive invites memberships.

"Organization for immediate action" of the Better Heating-Cooling Council was announced by John E. Reed. newly elected president, who said the industry-wide group is "now launching the most concerted and powerful promotion campaign ever mounted by this industry."

The action culminates many years of effort and desire by leaders in differing secitons of the hot water and steam heating and cooling industry to unify its promotional and educational efforts.

• **TO INFORM PUBLIC.**—Currently backed by a group of more than thirty manufacturers of hot water and steam heating and complementary cooling systems, the Council's purpose is to inform and educate the public, the trade, and the building industry about the advances and advantages of all types of water-fed heating and cooling systems for homes and small buildings.

• **FUNDS NEEDED.**—Concurrently, the Council is staging a drive for additional members and funds needed to mount a campaign budgeted at $250,000 annually. Of this total, Mr. Reed said, more than $100,000 has already been raised, which is more than enough to insure a successful beginning. An invitation to membership in the Council is open to all manufacturers of basic equipment or components used in water-fed heating or cooling systems and, on an equal basis, to all industry wholesaler and contractor associations—national, regional, or local.

HOME COOLING RESEARCH

shows that homes heated by hot water or steam can also be cooled by separate water chilling system.

Research sponsored by the Institute of Boiler and Radiator Manufacturers at the University of Illinois has developed a new method of central summer cooling for homes heated by hot water or steam. The method utilizes a cooling system that is separate from the hot water heating system and operates on chilled water.

• **SYSTEM.**—In the cooling system, a circuit of small piping is used to hook up a water chiller to a forced convector, consisting of fan, coils, and filter. The water chiller is placed in the basement, utility closet, outdoors, or any other out-of-the-way location.

The convector, the report stated, is usually placed in a central position in the house hidden in a plenum or distributing chamber, which may be formed by dropping a center hall ceiling or center room ceiling by about one foot. Cooled currents of air are released from the plenum through high wall registers into surrounding rooms.

(*Continued on page* 144)

Specify RECO

WHEN SWANK, INC. CHOSE RECO INSTANTANEOUS HEATERS, they had 4 major requirements: Top Quality, Fair Price, Dependable Performance and Quick Delivery. RECO met all 4 and the Instantaneous Heaters selected are turning in fine no-maintenance service. Let RECO's full line of Instantaneous Heaters and Heat Exchangers solve *your* hot water problems, too. SPECIFY RECO.

Swank, Inc., Home Office Attleboro, Mass
Architect Lockwood Greene Engineers, Inc
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RECOgnized for superior quality in 48 states and 16 foreign countries.

RECOmmended by leading engineers, contractors and architects.

RECO Hot Water Storage Heaters, Convertors and Instantaneous Heaters.

For free catalogs and the name of the RECO Representative nearest you, write:
Richmond Engineering Co., Inc., Dept. C, 7th & Hospital Streets, Richmond 5, Va.—Phone 7-2611

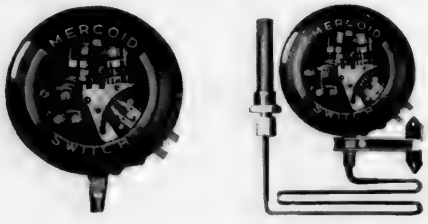
Richmond Engineering CO., Inc.

DO YOU HAVE A TWO-STAGE PRESSURE OR TEMPERATURE CONTROL PROBLEM

MERCOID® HAS THE SOLUTION

Mercoid DA-400 Series Controls are dual purpose controls (available for pressure or temperature) incorporating a single element operating two separate independently adjustable Mercoid magnetic mercury switches. Circuit arrangements can be supplied for various operations, a few examples are:

- ***Close one alarm circuit at high setting and a separate circuit at low setting. Both circuits remain open between the high and low operating points of the two switches.***
- ***As an electrical interlock to open one circuit on a rise above and the second circuit on a drop below the set operating point.***
- ***To provide two-stage control by opening one circuit on a rise and a second circuit on a further rise.***



***Pressure types* available in 17 different operating ranges from 0-30" vac. to 300-2500 psi. *Temperature types* available in 11 operating ranges from -30-60°F. to 370-530°F.**

All types are equipped with external adjustments and visible calibrated dial.

WRITE FOR BULLETIN CA-PT

THE MERCOID CORPORATION
4201 BELMONT AVE., CHICAGO 41, ILLINOIS, U.S.A.

HOME COOLING RESEARCH

(*Continued from page* 142)

• **COST.**—A cost study showed that at an average outdoor temperature of 84 deg F (maximum outdoor temperature about 94 deg), the cost of operation was about ninety-five cents a day. Lower average temperatures would result in lower daily operating costs.

As for installation, it is estimated the system can be put into the average house for between $1000 and $1400.

HEMEON ASSOCIATES

is organized as Mellon Institute scientist forms firm to give general consultation on air pollution.

Organization of a firm for general consultation on all aspects of air pollution has been announced by Wesley C. L. Hemeon, who has been widely known as engineering director of Industrial Hygiene Foundation and senior fellow of Mellon Institute in Pittsburgh, Pa. Mr. Hemeon is resigning from these positions in April to head the new firm which will be known as Hemeon Associates. Headquarters offices and laboratory will be in the Loeffler Building at 121 Meyran Avenue, in the Oakland section of Pittsburgh.

• **STAFF.**—Heading a staff of specialists in various aspects of air pollution will be George F. Haines, Jr., as chief engineer. As a fellow of Mellon Institute, Mr. Haines has been associated with Mr. Hemeon for the past ten years in various researches on dust control, air pollution and industrial hygiene.

The staff will be supplemented by a team of consulting associates which will provide authority in the fields of chemistry, engineering, meteorology, plant physiology and pathology and wind tunnel aerodynamics.

Consulting associate in meteorology will be Maynard S. Smith, Brookhaven National Laboratory, Upton, Long Island, who is a nationally-known authority on dispersion of air pollutants from chimneys. Since 1948, Mr. Smith has directed research in micrometeorology at the Brookhaven atomic energy center. Professor J. K. Cholak, Kettering Laboratory in the Department of Preventive Medicine and Industrial Health, College of Medicine, University of Cincinnati will serve as consulting associate in air pollution chemistry. Professor Gordon Strom of the Department of Aeronautical Engineering at New York University will be consulting associate on studies in the model wind tunnel which will be constructed at the firm's Pittsburgh laboratory.

Mr. Hemeon, a native of Boston, Mass., was graduated from Massachusetts Institute of Technology in 1926. Before moving to Pittsburgh in 1943, he was in charge of dust control engineering for the Massachusetts State Department of Labor. He is well known for his researches and numerous publications on industrial ventilation, dust control and air pollution. These include a book, Plant and Process Ventilation, published recently by The Industrial Press, and one on outdoor air pollution which is to be published next year.

BEFORE YOU BUY A PACKAGE BOILER

CHECK THIS LIST!

If you need a package boiler, the list at the right can give you some interesting answers. Of course, C-E's Type VP Boiler rates a "yes" answer to every question. It offers also many other operational advantages, such as simple, effective soot blowing; high heat absorption; low draft loss, no dead gas pockets and simple baffle arrangements.

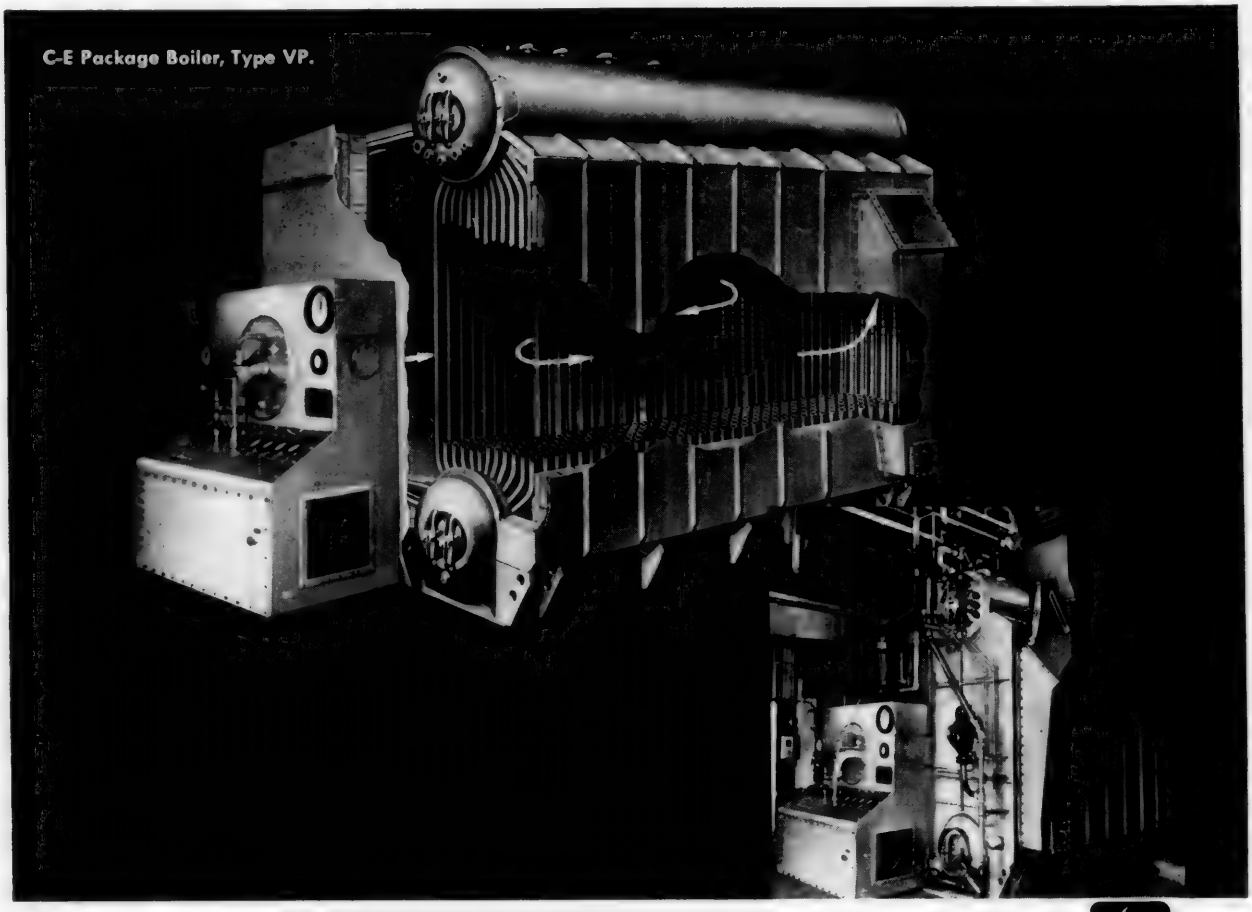
That's why VP purchasers range from small companies to some of the nation's largest – plus schools, institutions, government agencies, including the Atomic Energy Commission. These users employ VP Boilers for all types of applications – heating, process, even power generation.

SPECIFICATIONS OF THE VP BOILER

Capacity — 4,000 to 40,000 pounds of steam per hour
Pressures — up to 500 pounds per square inch
Fuel — oil or gas
Erection — completely shop-assembled
Foundation — simple concrete slab

Have full details on the VP next time you are in the market for a boiler of moderate capacity. Get the new Catalog VP-177, which contains specifications, and information on dimensions, construction details and controls. B-845B

	BOILER A		B		C	
	Yes	No	Yes	No	Yes	No
Will your boiler be a real "package" type with control panel and all controls mounted integral with the boiler?						
Will your package boiler be equipped with drum internals to assure dry steam?						
Will its "steam quality" be backed with a guarantee?						
Will your boiler have a 30-in. lower drum to provide convenient accessibility?						
Will yours be a one-burner boiler, with a simple wiring and control system?						
Will your boiler have the largest load swing range available?						
Will your boiler be equipped with a quiet centrifugal fan?						
Will your furnace be *completely* water-cooled?						
Will your furnace have the highest ratio of water cooled surface to furnace volume?						



C-E Package Boiler, Type VP.

COMBUSTION ENGINEERING

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BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

EXHAUST...

WHEN You Want It
WHERE You Want It

FOR EVERY INDUSTRIAL APPLICATION

with FLEXAUST® hose

In a large midwestern chemical plant, 12" I.D. Flexaust Hose is used to exhaust fumes and heat from a flame-cutting operation. The hood to which the Flexaust hose is attached is carried on a movable boom, putting the exhaust exactly where it is needed. Available in 1¼" to 36" I.D.

EASY TO INSTALL

• Unskilled labor can cut and install Flexaust duct quickly and easily. A set-up like this one can be easily installed and just as easily moved to meet changes of process or relocation of machines. It can be cut to any length, and is easily coupled to any other duct work.

HIGHLY FLEXIBLE

• No layout problems with Flexaust! Made of nylon or cotton base impregnated with age-resistant Neoprene compound and reinforced with spiral wire, it will not kink or flatten. It maintains its cross-section even on sharp bends. As it has excellent lengthwise compressability, it is easy to transport and store.

LONG LASTING

• Flexaust is highly resistant to corrosion, moisture, chemical deterioration and flexing fatigue. Its bonded, double ply, double overlap construction makes it fully air-tight for pressure, suction or gravity operations. It outlasts other types of ducts in handling abrasive dusts as in grinding, materials handling, etc.

You can use Flexaust for fume exhaust, for dust or chip collection, for ventilation, for handling of bulky materials. In every application it proves its economy in first cost and simplicity of installation . . . its efficiency in its performance and adaptability to all types of jobs. Also available, retractable type Portovent duct.

Write today for bulletins giving complete data on flow characteristics, installation procedure, sizes, fittings and accessories.

THE FLEXAUST COMPANY

Dept. HV-4, 100 Park Avenue, New York 17, N. Y.
Formerly American Ventilating Hose Co.
Stocks are available from coast to coast

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

HYDRAULIC INSTITUTE STANDARDS

Standards of the Hydraulic Institute represent a complete revision and rearrangement of the format as regards earlier editions. This is the tenth edition and it contains engineering data devoted entirely to hydraulic pumps.

The book has five sections with three sections devoted to the basic types of pumps, namely, centrifugal, rotary and reciprocating. Each of these sections is arranged in a uniform manner to cover the classification, nomenclature, application, rating, testing and instructions for installation, operation and maintenance pertaining to that type of pump.

A Data Section has information on friction loss for water and for viscous liquids in pipes, valves and fittings; data on pipe dimensions; properties of water; viscosity of common liquids. Friction loss tables have been arranged for simplicity and convenience.

Each copy holder will be notified of all future revisions and since the book consists of loose leaf pages, insertions will be easy to make.

Hydraulic Institute Standards. Pages are 8½ x 11 inches, placed in a 5-ring, semi-limp loose leaf binder, with tabs to separate the various sections of the material. Published by the Hydraulic Institute, 122 E. 42nd St., New York 17, N. Y. Price, $4.75.

YEAR BOOK OF THE HEATING AND VENTILATING INDUSTRY

Among the recent publications is the ninth edition of the Year Book of the Heating and Ventilating Industry (England). Its purpose is to provide in one volume technical and trade information for the benefit of architects, consulting engineers and others who are in close touch with heating and ventilating contractors.

The book contains a number of articles, forms of contracts, membership list of the Association of Heating, Ventilating and Domestic Engineering Employers, buyers' guide, trade names, manufacturers addresses, and technical and trade associations.

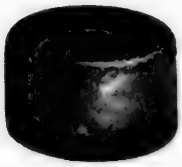
Year Book of the Heating and Ventilating Industry. Cloth bound, 5 x 8 inches, 379 pages plus 75 pages of advertisements. Published by Technitrade Journals, Ltd., Carlisle House, 8, Southampton Row, London (England), W.C. 1.

• • •

ASTM Specifications for Steel Piping Materials—This publication contains all the specifications for carbon steel and alloy steel pipe and tubing issued by the American Society for Testing Materials. Specifications cover pipe used to convey liquids, vapors and gases at normal and elevated temperatures, still tubes for refinery service, heat exchanger and condenser tubes, and boiler and superheater tubes. There is also included material on castings, forgings, bolts and nuts. American Society for Testing Materials, 1916 Race St., Philadelphia. Pa. Price, $4.

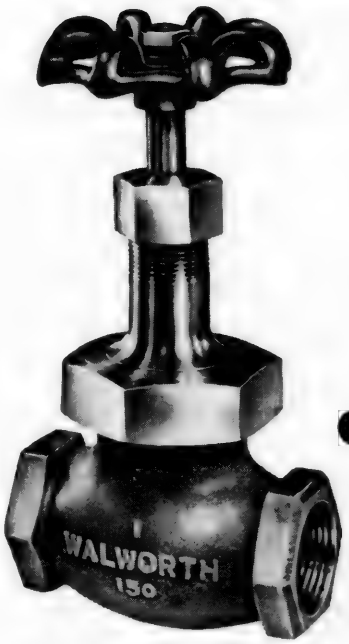
Toothed Lock Washer: Prevents loss of stem nut due to vibration, thereby holding the handwheel securely.

Newly Designed Handwheel: Air-cooled, finger grip handwheel affords sure grip even with greasy gloves.



Improved Packing: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure.

WALWORTH



IMPROVED

No. 95

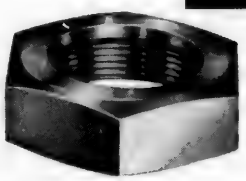
BRONZE

GLOBE VALVE

also available in Angle Type (No. 96)

The service ratings of the Walworth No. 95 are 150 pounds per square inch steam at 500F, and 300 pounds per square inch non-shock cold water, oil, and gas. In the manufacture of this quality bronze valve, more than 47 gages are used in machining parts to micrometric accuracy, thus insuring interchangeability of parts. For further information see your local Walworth distributor, or write: Walworth Company, 60 East 42nd St., New York 17, N. Y.

note these 7 Great Features



Hexagonal Union Bonnet Connection: Eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and assembled.

WALWORTH

valves and fittings

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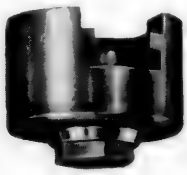
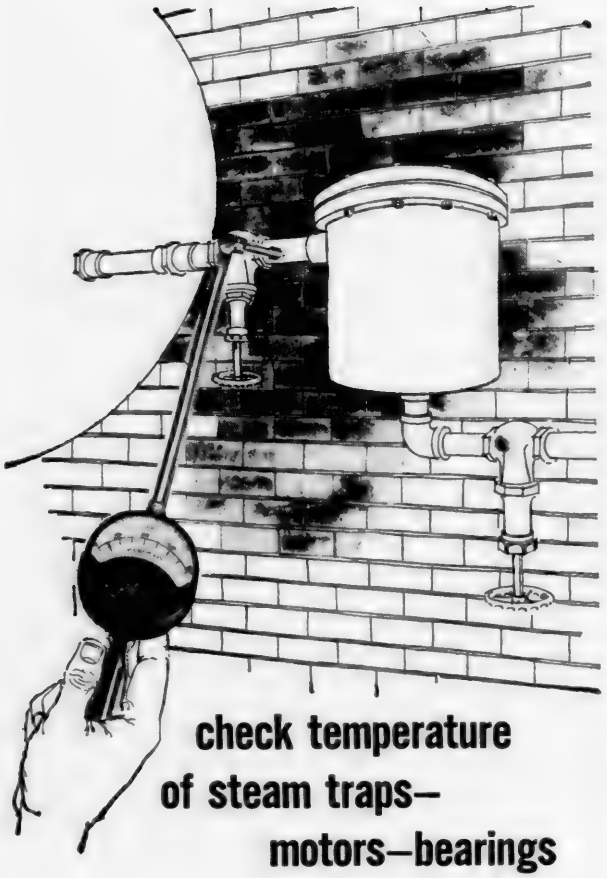
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



New Cylindrical Disc Holder: The design of the top portion of the disc holder keeps the disc accurately guided under all operating conditions.

Renewable Asbestos Disc: This disc is suitable for steam up to 500F and is resistant to oil, gasoline, and many chemicals at atmospheric temperatures. Discs for special services are available.

Extra Strong Body: Made of Composition M (ASTM B61) bronze thick enough to provide a high safety factor. Valves undergo hydrostatic shell test of 450 psi.



check temperature of steam traps– motors–bearings

. . . quickly and accurately with the Alnor Pyrocon, the portable contact pyrometer for taking surface temperatures. This handy, portable instrument can be your most useful maintenance and installation tool . . . it provides accurate temperature readings instantly of any surface (metallic or non-metallic), flat, curved, stationary or revolving.

It's a well-balanced instrument mounted in a sturdy case for protection against the usual hazards of on-the-job service. Jeweled movement is also heavy-duty, shock-resistant type that will withstand hard and continuous use . . . performing with laboratory accuracy.

A wide selection of thermocouples and extension arms assures its adaptation to your needs. Eight standard F. scale ranges are available up to 1200°F. Send for complete details contained in Bulletin 4257. Illinois Testing Laboratories, Inc., Rm. 514, 420 N. LaSalle St., Chicago 10, Ill.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Canadian Degree Days for February, 1956*

City	February		Cumulative	
	1956	Normal	1955-1956	Normal
Calgary, Alta.	1552	1355	8128	6666
Charlottown, P. E. I.	1306	1338	5572	5666
Crescent Valley, B.C.	1271	1112	6064	5743
Edmonton, Alta. ...	1631	1501	8682	7299
Fort William, Ont...	1568	1582	7184	7204
Grande Prairie, Alta.	1729	1456	9501	7456
Halifax, N. C.	1114	1170	4788	5068
London, Ont.	1184	1240	5267	5253
Medicine Hat, Alta.	1612	1406	7740	6438
Moncton, N. B.	1354	1392	5908	6106
Montreal, P. Q.	1314	1460	5884	6108
North Bay, Ont. ...	1436	1492	6821	6653
Ottawa, Ont.	1364	1459	6155	6382
Penticton, B. C. ...	1175	969	5329	4779
Prince George, B. C.	1567	1305	8390	6677
Quebec City, P. Q...	1387	1481	6350	6688
Regina, Sask.	1817	1764	8709	8137
St. John, N. B.	1291	1266	5690	5652
Saskatoon, Sask. ..	1854	1635	8961	7911
Timmins, Ont.	1554	1734	7572	7818
Toronto, Ont.	1072	1206	4850	5154
Vancouver, B. C. ..	869	736	4173	3797
Victoria, B. C.	823	689	4077	3414
Windsor, Ont.	1087	1148	4775	4877
Winnipeg, Man. ...	1817	1775	8255	8091

*These data are supplied through the courtesy of the Meteorological Division, Air Service Branch, Department of Transport, Canada.

The Department reports a slight revision in the figures for January, as published in last month's issue. Corrected figure is: Montreal, P. Q., 1416.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available.

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Greenbrier, White Sulphur Springs, West Virginia. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. . . . . **APRIL 19-21, 1956.**

INDUSTRIAL HEALTH CONFERENCE—Annual meeting of five groups, including the American Industrial Hygiene Association, at Convention Hall, Philadelphia, Pa. Si Shalltz, Adelphia Associates, Western Saving Fund Bldg., Philadelphia 7, Pa. . . . . **APRIL 21-27, 1956.**

ENGINEERS CONFERENCE—Third annual Conference for Engineers, sponsored by the College of Engineering, Ohio State University, to be held at the University. Harold A. Bolz, Associate Dean, College of Engineering, The Ohio State University, Columbus 10, Ohio. . . . . **MAY 4, 1956.**

LIQUEFIED PETROLEUM GAS SHOW—Convention and trade show of the Liquefied Petroleum Gas Association, at the Conrad Hilton Hotel, Chicago, Ill. R. E. Borden, director of publicity of the Association, 11 S. LaSalle St., Chicago 3, Ill. . . . . **MAY 6-9, 1956.**

AIR CONDITIONING AND REFRIGERATION MEETING—Annual meeting of the Air Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. . . . . **MAY 7-9, 1956.**

WELDING SHOW—Fourth Welding Show of the American Welding Society, at Memorial Auditorium, held in conjunction with the Society's annual spring meeting at the Hotel Statler, Buffalo, N. Y. Banner & Greif, 369 Lexington Ave., New York 17, N. Y. . . . . **MAY 7-11, 1956.**

INDUSTRIAL SERVICE CONVENTION—23rd annual convention of the National Industrial Service Association, at the Bellevue-Stratford Hotel. Fred B. Wipperman, executive secretary of the Association, 818 Olive St., St. Louis 1, Mo. . . . . **MAY 13-16, 1956.**

(Concluded on page 150)

THE NEW UNARCO DYNA-PAC

...FEATURING BOTH ECONOMY AND EFFICIENT LONG LIFE

- **2-, 3-, 5-ton capacities in water-cooled or air-cooled models**
- **For residential and commercial installations**
- **Selective manual humidity control**
- **Built-in plenum**
- **4-way adjustable top air discharge on free blow models**

The all-new UNARCO Dyna-Pac meets the challenge of better air conditioning at lower cost. What's more, it was designed with the installing contractor in mind. All Dyna-Pac units are pre-wired and pre-piped for easy, low-cost installation.

There is economy in both the low initial cost and minimum maintenance required. There is also economy of space with the compactly designed DYNA-PAC. Duct models can be attached to existing warm air heating systems to provide year 'round conditioning.

Write Dept. HC-105B for full information, including catalog and prices.

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332 South Michigan Avenue, Chicago 4, Illinois

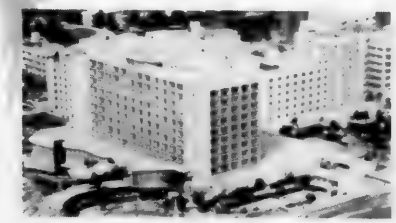
The Royal-Aire—by UNARCO—representing the ultimate in packaged air conditioning equipment. Available in 5 models, 3 through 15 h.p.

UNARCO **PACKAGED AIR CONDITIONERS**

HAVE YOU ENROLLED IN UNARCO'S DEALER PLU$ PLAN? WRITE NOW FOR FULL DETAILS OF BIG DEALER AWARD PROGRAM.

ON THE
Booming Florida Scene
DRAYER-HANSON AIR CONDITIONING

MORE

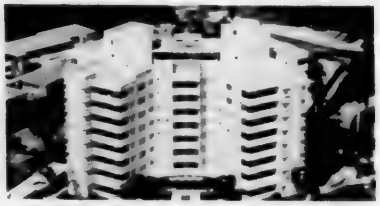


Seville Hotel, Miami Beach. Architect: Melvin Grossman/Air Conditioning Engineer: Sam L. Hamilton.

AND MORE

Hollywood Beach Hotel, Hollywood Fla. Architect: Melvin Grossman/Engineers: Sasnett Engineering.

AND MORE



Belle Isle Apartments, Miami Beach. Architect: Robert B. Swartburg/ Engineers: Altec Engineering Co.

AND MORE

Lucerne Hotel, Miami Beach. Architect: Carlos B. Schoeppl/Engineers: Altec Engineering Co.

A sure sign of the times in Florida — "Air Conditioning by Drayer-Hanson"! . . . in a wide variety of installations: the new Biscayne Shopping Plaza, La Gorce Country Club, Miami Sheriff's Station, El Sirocco Motor Hotel, many more. Marked advantages to meet any requirements with D-H Flexazone systems! Spotaire systems! HH and HHV systems!

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INCORPORATED

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(Subsidiary of National - U.S. Radiator Corporation)

(Concluded from page 148)

DESIGN ENGINEERING SHOW—First Design Engineering Show, held in conjunction with a conference on design engineering sponsored by the American Society of Mechanical Engineers, at Convention Hall, Philadelphia, Pa. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. . . . . **MAY 14-17, 1956.**

MECHANICAL CONTRACTORS MEETING—Annual meeting of The Mechanical Contractors Association of America (formerly, Heating, Piping and Air Conditioning Contractors National Association), at The Brown Hotel, Louisville, Ky. Secretary of the Association, 1250 Avenue of the Americas, New York 20, N. Y. . . . . **MAY 15-18, 1956.**

BUILDING RESEARCH MEETING—Fifth annual meeting of the building Research Institute, at the Sheraton-Brock Hotel, Niagara Falls, Ontario. W. H. Scheick, executive director of the Institute, 2101 Constitution Ave., Washington 25, D. C. . . . . **MAY 20-22, 1956.**

AIR POLLUTION MEETING—1956 Niagara Frontier annual meeting of the Air Pollution Control Association, in Buffalo, N. Y. H. C. Ballman, executive secretary of the Association, 4400 Fifth Ave., Pittsburgh 13, Pa. . . . . **MAY 21-24, 1956.**

TECHNICAL CONFERENCE—First annual Technical Conference of the National Warm Air Heating and Air Conditioning Association, at the Edgewater Beach Hotel, Chicago, Ill. George Boeddener, secretary of the Association, 640 Engineers Building, Cleveland 14, Ohio. . . . . **MAY 24-25, 1956.**

ASRE MEETING—52nd annual meeting of the American Society of Refrigerating Engineers, at the Sheraton-Gibson Hotel, Cincinnati, Ohio. R. C. Cross, secretary of the Society, 234 5th Ave., New York 1, N. Y. . . . . **JUNE 3-6, 1956.**

NDHA MEETING—47th annual meeting of the National District Heating Association, at the Inn and Lodge, Williamsburg, Va. J. F. Collins, Jr., secretary-treasurer of the Association, 827 N. Euclid Ave., Pittsburgh, Pa. . . . . **JUNE 4-7, 1956.**

PLUMBING AND HEATING EXPOSITION—1956 National Plumbing and Heating Exposition, in conjunction with the 74th meeting of the National Association of Plumbing Contractors, Inc., to be held in the Milwaukee Auditorium, Milwaukee, Wis. Secretary of the Association, 1016 20th, N. W., Washington, D. C. . . . . **JUNE 11-14, 1956.**

OIL-HEAT SHOW—21st National Oil-Heat and Air Conditioning Exposition, at the new Coliseum, New York, N. Y., to be held concurrently with the 34th Annual OHI Convention of the Oil-Heat Institute of America, with headquarters at the Park Sheraton Hotel, New York. R. H. L. Becker, managing director of the Institute, 500 Fifth Ave., New York 36, N. Y. . . . . **JUNE 11-16, 1956.**

ASME MEETING—Semi-annual meeting of The American Society of Mechanical Engineers, at the Hotel Statler, Cleveland, Ohio. Secretary of the Society, 29 W. 39th St., New York, N. Y. . . . . **JUNE 17-21, 1956.**

TESTING MATERIALS MEETING—59th annual meeting of the American Society for Testing Materials, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . . . **JUNE 17-22, 1956.**

ASHAE MEETING—Semi-annual meeting of the American Society of Heating and Air-Conditioning Engineers, Inc., at the Shoreham Hotel, Washington, D. C. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. . . . . **JUNE 18-20, 1956.**

INSTRUMENT SOCIETY EXHIBIT—11th annual Instrument-Automation Conference and Exhibit (International), of the Instrument Society of America, at the new Coliseum building, New York, N. Y. J. McCaffery, assistant executive secretary of the Society, 1319 Allegheny Ave., Pittsburgh 13, Pa. . . . . **SEPTEMBER 17-21, 1956.**

ASME MEETING—Annual meeting of the American Society of Mechanical Engineers, Hotel Statler, New York, N. Y. Secretary of the Society, 29 W. 39th St., New York, N. Y. . . . . **NOVEMBER 25-30, 1956.**

HEATING AND AIR CONDITIONING EXPOSITION—1957 International Heating & Air-Conditioning Exposition, under the auspices of the American Society of Heating and Air-Conditioning Engineers, Inc., to be held at International Amphitheater, Chicago, Ill. E. K. Stevens, manager, International Exposition Co., 480 Lexington Ave., New York 17, N. Y. . . . . **FEBRUARY 25-MARCH 1, 1957.**

METALS CONGRESS AND EXPOSITION—10th Western Metal Congress and Exposition, sponsored by the American Society for Metals, and other technical groups, at the Pan-Pacific Auditorium and the Ambassador Hotel, Los Angeles, Calif. W. H. Eisenman, managing director of the Society, 7301 Euclid Ave., Cleveland 3, Ohio. . . . . **MARCH 25-29, 1957.**

DEPENDABLE,

PRECISELY ACCURATE

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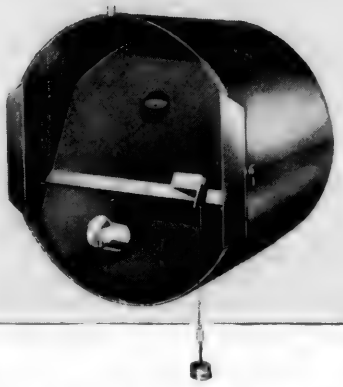
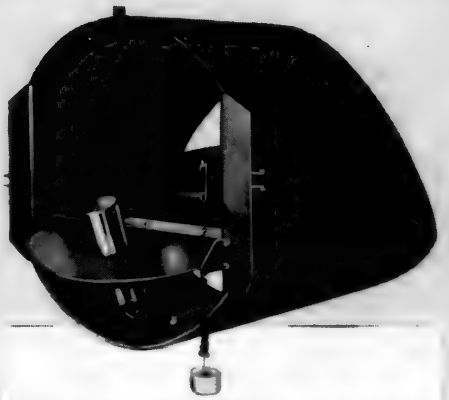
for coal fired, oil fired, gas fired or gas-oil fired

HEATING PLANTS



FIELD TYPE "M" for coal and oil fired heating plants

Heavy duty commercial model in 28" and 32" sizes. Heavy, rigid construction assures long, trouble free service. Stainless steel knife edge bearing for permanent sensitivity. Also available in 6" through 24" sizes for domestic and commercial installations. First choice of heating men — the round control you can level on any flue.



FIELD TYPE "MG" for gas and gas-oil fired heating plants

A heavy duty, precision built control in sizes 8" through 32" for commercial and industrial installations. Stainless steel knife edge bearings for permanent sensitivity. Gate opens inward to regulate updrafts, and outward to relieve down-drafts. Optional safety switch available where codes require. Fully proven, accepted virtually everywhere.

They're real HEAVYWEIGHTS

Compare the weight of a Field Control to any other available. Here is proof of the massive, welded construction, long, vibration-free service, that permits Field's supreme accuracy.

Size Control	Gate	Thickness of Parts Side Plates	Ring	Collar	Wt. without Crtn. or Crate
14 M	16 Ga.	16 Ga.	⅛ x 2"	22 Ga. Galv.	19#
16 M&MG	16 Ga.	16 Ga.	⅛ x 2"	18 Ga. Galv.	28#
18 M	16 Ga.	16 Ga.	⅛ x 2"	18 Ga. Galv.	35#
20 M&MG	16 Ga.	16 Ga.	¼ x 2"	18 Ga. Galv.	41#
24 M&MG	14 Ga.	16 Ga.	¼ x 2"	18 Ga. Galv.	65#
28 M&MG	14 Ga.	14 Ga.	¼ x 4"	14 Ga. H.R.S.	110#
32 M&MG	14 Ga.	14 Ga.	¼ x 4"	14 Ga. H.R.S.	140#

See our complete new exhibit at the National Oil Heat and Air Conditioning Exposition at the New York City Coliseum, June 11-15, 1956. Space No. 248.

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From components to standard "custom-size" cabinets and complete systems, Allenco fire equipment is *designed* and *proved* to meet 3 main requirements—

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Suits fire regulations, insurance standards, practical needs

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Looks well, permanently, in any setting . . . any structure

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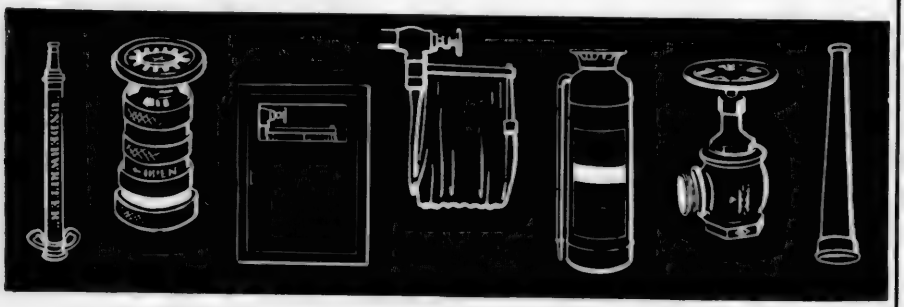
Saves time in specifying* and installing, lasts longer



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NEW CATALOGS

Use the prepaid postcard on page 101 for securing your copies of catalogs described in this department.

CONDENSER BULLETIN — Bulletin No. U-210C on remote type, air-cooled condensers is issued by Kramer Trenton Co., Trenton, N. J. The bulletin gives performance data, conversion factors, dimensions and fittings, and a selection chart for the condensers.....**Item 74**

VENTILATOR CATALOG — An 18-page catalog of power roof ventilators for institutional, commercial, and industrial installations is offered by Roof Ventilator Division, Atmos Corp., Chicago, Ill. The catalog gives the dimensions, ratings, and installation details for centrifugal and propeller ventilators, both belt- and direct-driven.....**Item 75**

VIBRATION CONTROL—A line of vibration control material is described and illustrated in a catalog (No. IS-55) released by T. R. Finn & Co., Inc., Industrial Div., Hawthorne, N. J. The catalog describes the granular structure of the material, called Isolant. Descriptions of typical installations are also given.....**Item 76**

CLAY CONDUIT BULLETIN—Clay conduit systems for underground steam, hot water, and process piping are described in Bulletin 56, available from Heat Transmission Conduit Co., Cleveland, Ohio. The 20-page bulletin is not only descriptive of the various types of clay conduit structures produced but also of their application to various installations.....**Item 77**

COOLING CONTROL CATALOG—A 1956 condensed cooling control catalog (1487-AB) is announced by Penn Controls, Inc., Goshen, Ind. The 24-page catalog presents brief specifications and operating data on the company's line of mechanical cooling controls.....**Item 78**

BOILER DATA—A bulletin with data on a cast iron heating boiler is offered by National-U. S. Radiator Corp., Johnstown, Pa. The bulletin lists ratings and engineering data and the dimensions and tapping sizes of the boiler.....**Item 79**

CATALOG ON ROOM COOLERS—An 8-page catalog (No. 210-B) detailing a line of remote room air conditioners has been released by Acme Industries, Inc., Jackson, Mich. The catalog includes a selection procedure, general specifications, dimensions, and capacity tables.....**Item 80**

DUCT SILENCER CATALOG—A brochure describing the Q-duct silencing system for air conditioning and ventilation installations is available from Industrial Acoustics Co., Inc., New York, N. Y. The catalog describes in detail the various applications of the pre-fabricated units, which are available in over one hundred forty eight sizes to fit any installation.....**Item 81**

REGISTER AND GRILLE CATALOG—A 32-page catalog (No. 75) of registers, grilles, and volume control dampers is issued by Carnes Corp., Verona, Wis. The catalog gives engineering data, performance data, a selection chart and ordering instructions with list prices.....**Item 82**

INCINERATOR CATALOG—A catalog, in color, describing a line of incinerators for industrial and commercial use is available from Winnen Incinerator Co., Bedford, Ohio. Included are illustrations of each model, descriptions with specifications, cut-a-way views and a list of optional equipment.....**Item 83**

HUMIDITY RECORDER BULLETIN — A bulletin (H1008) describing and illustrating a line of portable recorders for relative humidity and temperature is released by The Bristol Co., Waterbury, Conn. The 6-page bulletin shows samples of typical records made by the recorders. Permanent mounting models are also shown in the catalog.....**Item 84**

DATA ON ALUMINUM—Information on aluminum mill products and services is contained in a 24-page booklet available from Kaiser Aluminum & Chemical Sales, Inc., Oakland, Calif. The brochure offers data on aluminum alloys, forms, mechanical and physical properties, applications, fabricating and finishing techniques and availability.....**Item 85**

FIBER PIPE CATALOG—A catalog of bituminized fiber pipe products is issued by The Central Foundry Co., Newark, N. J. The folder illustrates and gives complete specifications for the company's line of bituminized fiber sewer pipe, perforated pipe, and couplings. It also includes fittings and adapters made of cast iron for use with the fiber products. ...**Item 86**

SCHOOL HEATING MANUAL—A 62-page manual on automatic coal heat for schools is published by the National Coal Assn., Washington, D. C. As an aid to school boards, architects, and engineers concerned with school construction, a special section of the book presents six suggested boiler room plans to meet various heating requirements.....**Item 87**

PRODUCT DIRECTORY—A 24-page directory (B6057) of product literature has been released by Allis-Chalmers Mfg. Co., Milwaukee, Wis. In addition to an alphabetical description of company products and their descriptive literature, the directory also lists the location of the firm's seventeen plants, sales offices, and tractor branch houses.....**Item 88**

INSULATION CATALOG — A 12-page technical brochure on Haysite, a glass reinforced, Alkyd base, polyester insulating material, is available from Reinforced Plastics Div., Hays Mfg. Co., Erie, Pa. The brochure contains a characteristics chart, comparison charts, and information on applications for the material.....**Item 89**

MAGNETIC STARTER BULLETIN—An 8-page bulletin (1020) on a line of reversing and non-reversing, line voltage, a-c magnetic starters is issued by RBM Div., Essex Wire Corp., Logansport, Ind. Construction, application and engineering specifications, pertaining to the various types of starters are included. Also listed are thermal overload relays which are used in conjunction with the starters.....**Item 90**

CONVECTOR CATALOG—A 24-page catalog of convectors is published by National-U. S. Radiator Corp., Johnstown, Pa. The catalog gives dimensions and installation data and includes nine pages of ratings of the convectors.....**Item 91**

(*Continued on page* 154)

Another Allenco FIRST.
to accommodate cott

Allenco fire equipment need not be hidden. Cabinets can be placed for most *utility* without disturbing *eye*-tility.

Units shown are in office buildings, a hospital and a school.

Having a *complete* line, Allenco has what it takes for *any* job.

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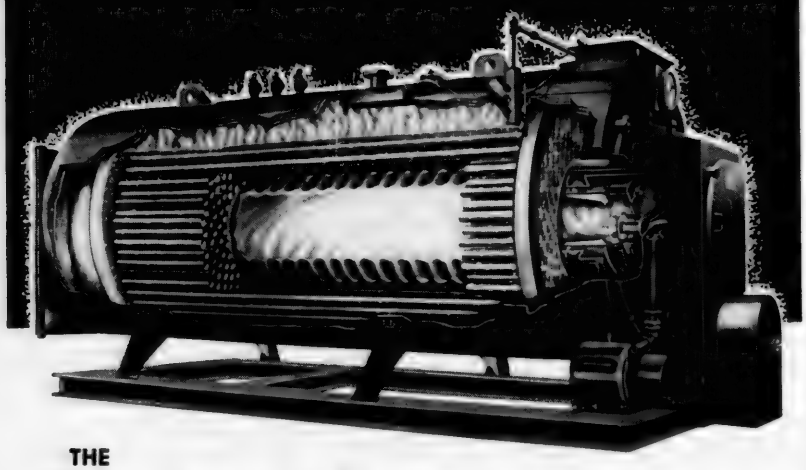
GET YOUR
STEAM and HOT WATER
FROM A LOW COST PRODUCER!



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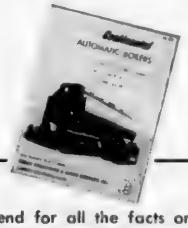
Continental AUTOMATIC BOILER

- generates the steam and hot water you need at low fuel cost and with little maintenance.
- is highly efficient—over 80% guaranteed—due to its unique "spinning gas technique".
- can be opened for cleaning or inspection by one man in less than ½ hour, for it has hinged doors at both ends.
- distributes heat evenly to the rear tube-sheet and all return tubes. This results in balanced water circulation and uniform longitudinal expansion of the entire pressure vessel.
- has long service life because of free, rapid water circulation, uniform heat transfer, simplicity of construction and quality workmanship.

Fully automatic, Continental Boilers are used for hot water and high or low pressure steam applications. Units range from 20 to 500 hp and can be gas, oil or combination fired.

Write for catalog and the name of your nearest distributor. Let us bid on the next boiler you need.



Send for all the facts on the Continental Automatic Boiler.

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NEW CATALOGS

(*Continued from page 153*)

Use the prepaid postcard on page 101 for securing your copies of catalogs described in this department.

ELECTRIC HOME HEATING—A booklet (B6700) entitled Electric Heating Users Guide is available from the Westinghouse Electric Corp., Pittsburgh, Pa. The 20-page booklet is a comprehensive discussion of home heating in general and electric heating in particular. Included are such topics as the need for heat, the different methods of electric heating, and the costs involved.....**Item 92**

PRESSURE REDUCING BULLETIN—A 4-page bulletin describing two models of direct-operated, water pressure, reducing valves is offered by Spence Engineering Co., Inc., Walden, N. Y. The bulletin lists available sizes, initial pressures, reduced pressure ranges, water capacity in gpm, and typical applications.....**Item 93**

PLUMBING GOODS CATALOG — A 28-page, illustrated catalog (No. 25) is issued for the plumbing goods trade by The Beaton & Corbin Mfg. Co., Southington, Conn. The catalog gives roughing dimensions on tubular traps, engineering data on a line of floor and ceiling plates, and references to every item in the line of products.....**Item 94**

CONTROL APPLICATION CHART — A comparative application chart (Form 3078) for mechanical cooling controls has been released by Penn Controls, Inc., Goshen, Ind. The chart is designed to make the selection of the correct control easier for the user. It lists the company's control for each application and also the comparable control of several competitors.....**Item 95**

WATER HEATING BOOKLET—A booklet on domestic hot water heaters is available from National-U. S. Radiator Corp., Johnstown, Pa. The 12-page booklet describes the operation of the heaters, their accessories, and gives ratings and specifications for oil- and gas-fired models.....**Item 96**

PLASTIC PIPE BROCHURES—A brochure describing chemically resistant and a brochure describing impact resistant, unplasticized polyvinyl chloride pipe and fittings are available from Industrial Div., The Colonial Plastics Mfg. Co., Cleveland, Ohio. Specifications of the pipe and its properties are listed in the brochures.....**Item 97**

GAS BURNER IS DESCRIBED—Bulletin G-200-B describing a gas burner for forced, induced, or natural draft operation in power plants is offered by The Mettler Co., Inc., Los Angeles, Calif. An automatic safety pilot and a three-way, electronic, flame failure protection system are also described.....**Item 98**

COAL DUST CONTROL—A booklet (Bulletin 551-D) on the control of dust from coal handling operations is available from Wheelabrator Corp., Mishawaka, Ind. Four illustrated case histories are presented. Some diagrams of materials handling systems and how dust control is exercised in them are also presented.....**Item 99**

BASEBOARD BROCHURE—A brochure illustrating and describing cast iron radiant baseboards is issued by National-U. S. Radiator Corp., Johnstown, Pa. The brochure gives water and steam ratings of the baseboards in addition to installation dimensions.....**Item 100**

COOLING EQUIPMENT BULLETIN—A 34-page bulletin (80-D) of air conditioning and refrigeration equipment is published by Frick Co., Waynesboro, Pa. The bulletin lists the uses and operating principles of the equipment and includes useful refrigeration tables.....**Item 101**

HYDRAULIC FITTINGS DATA — Data sheet Wc describes the line of one-piece fittings for hydraulic materials handling systems made by The Allen-Sherman-Hoff Co., Wynnewood, Pa. The two-page sheet illustrates three styles of elbow fittings and a lateral fitting. Details of construction and advantages are covered, and line diagrams with dimension tables give pertinent size data.....**Item 102**

VACUUM VALVE BULLETIN — Bulletin 401, describing a series of bronze, cast iron, and fabricated steel bellows-sealed vacuum valves, is issued by Kinney Mfg. Div., The New York Air Brake Co., Boston, Mass. The two-color bulletin contains engineering drawings, cutaway and exploded views of the valves, and general dimension charts for the various sizes.....**Item 103**

CHEMICAL PUMP BULLETIN—A line of small, rotary displacement and centrifugal pumps for chemical service is described and illustrated in a bulletin revised by Eco Engineering Co., Newark, N. J. A table of recommended uses, specifications for each unit, and photographs of numerous conventional drives and mountings are also contained in the bulletin.....**Item 104**

RUBBER LINING CATALOG—A catalog (No. 7115) of corrosion, abrasion, and contamination resistant rubber linings, for tanks, pipe, valves, and similar storage and process equipment, is issued by Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J. It is illustrated and contains charts, tables and diagrams, along with specifications and suggestions covering tanks for the chemical, process, and plating industries.....**Item 105**

ROOM AIR CONDITIONING—A 16-page, illustrated bulletin on the construction, operation, and application of Seazonaire remote room air conditioning units is published by Marlo Coil Co., St. Louis, Mo. The bulletin gives information, including construction details, performance characteristics, photographs, drawings and other pertinent data, on floor and ceiling type models.....**Item 106**

ALL-PURPOSE BOOKLET—An all-purpose booklet entitled Making The Weather Behave is available from Mueller Climatrol, Milwaukee, Wis. Booklet is available in two forms, one with a 16-page insert containing specifications and dimensions on every size and type unit in the company's line for distribution to architects, builders, and dealers, and the other without the insert for consumers.....**Item 107**

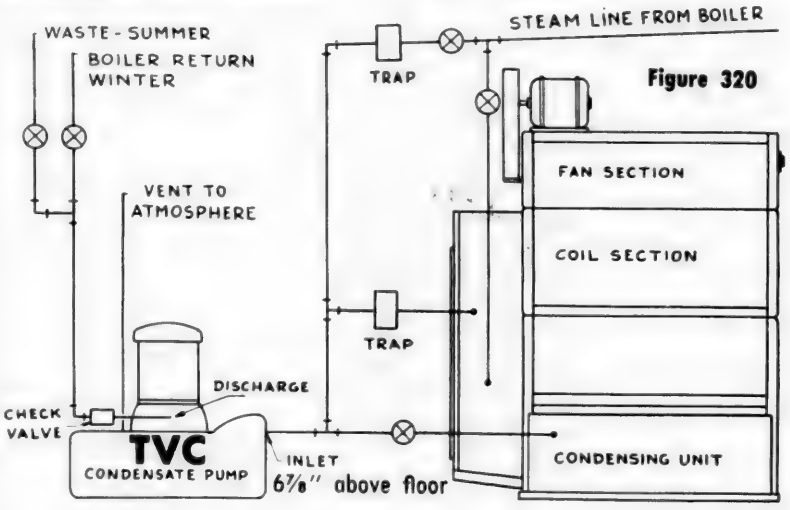
Use the prepaid postcard on page 101 for securing your copies of catalogs described in this department.

THE DUAL PURPOSE PUMP

1 SUMMER The TVC Pump disposes of the condensate resulting from the moisture removed from the air by the air conditioner.

2 WINTER The TVC Pump returns the steam condensate to the heating plant.

Figure 320 illustrates simple piping hookup with a unit used for air conditioning in the summer and heating in the winter. This type of unit is efficient, economical and easy to maintain.



The weil TVC PUMP is the answer

VERY LOW RETURN CONNECTION – 6⅞"
Makes pump adaptable to any installation

LOW SPEED (1750 RPM)
Assures long motor life

CAST IRON RECEIVER – 21" DIA.
Does not rust out – last for a lifetime

CAPACITIES
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10 to 30 lbs. P.S.I.

ECONOMICAL
Bronze casing and impeller, stainless steel shaft and brass strainer guarantee years of trouble-free service

FACTORY ASSEMBLED
Ready for immediate installation

AVAILABLE FROM JOBBERS' STOCKS

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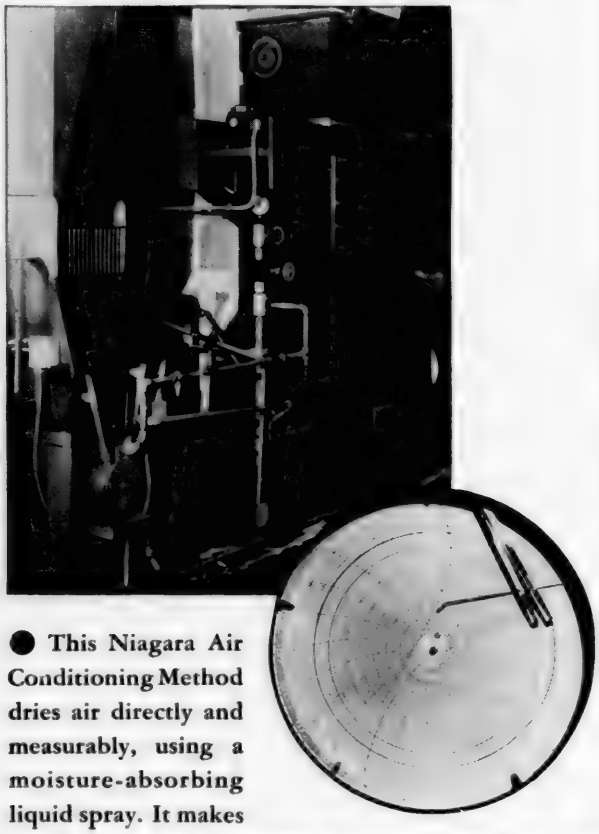
weil Dependable PUMPS

EXACT CONTROL

of Moisture Content

To Improve Your Product or Protect Your Materials or for Processes or Tests



● This Niagara Air Conditioning Method dries air directly and measurably, using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and gives you precise control with thermostats alone; no moisture-sensitive devices are needed. You have simpler, more trustworthy, less expensive control instrumentation. Niagara precise-control installations have the best record for reliability.

Niagara Air Conditioning provides you with any temperature and relative humidity you need. Using "Hygrol" absorbent, it is not expensive to operate, saving the refrigeration commonly used to condense moisture and making re-heat unnecessary in most cases. It gives large capacity with compact, easily-maintained equipment. Ask for Descriptive Bulletins #112 and #121. Address Dept. HV.

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District Engineers in Principal Cities of U. S. and Canada

IN THE FIELD

The **Airtemp Div.,** Chrysler Corp., Dayton, Ohio, has named **R. T. Marshall** its **New Orleans** Assistant Regional Manager. Prior to rejoining the company recently, Marshall, as general manager of Airtex, Inc., Houston, Tex., directed the distribution of Airtemp equipment to dealers in the Houston-Gulf Coast area.

Kramer Trenton Co., Trenton, N. J., announces the appointment of **Si J. Williams,** former manager of product research for the refrigeration division of Whirlpool-Seeger Corp., as its sales representative for **Ohio** and **western Pennsylvania.**

York Corp. has promoted **Brewer I. Glenn** from Service Supervisor to Zone Sales Supervisor of its Midwest district headquarters in **St. Louis, Mo.**

Westinghouse Electric Corp., Sturtevant Div., has appointed **Moore-Handley Hardware Co., Birmingham, Ala.,** as a distributor for its ventilating sets and industrial fans. The territory that will be served by the company includes all of **Alabama,** the **middle Tennessee** trading area, and the **northwest** part of **Florida.**

American Blower Corp., Detroit, Mich., announces the appointment of the **Marbut Co., Macon, Ga.,** and the **McCoumbs Supply Co., Denver, Colo.,** as distributors of the company's line of self-contained air conditioning units ranging from 3 to 20 ton capacities.

Tube Turns, Louisville, Ky., has made changes in territorial assignments of its sales department. **Earl R. Muir, Jr.,** formerly district manager at Seattle, has been transferred to **Louisville.** He will become manager of the newly formed Central District, comprising Kentucky and southern Ohio, Indiana, and Illinois. **Richard T. Burke,** formerly a member of the Houston office staff, has been appointed Muir's successor as district manager at **Seattle.**

York Corp., York, Pa., has named **Electric Constructors, Inc., Birmingham, Ala.,** wholesale distributor of its room air conditioners. Officers of Electric Constructors, Inc., are: Donald B. Clayton, Sr., President; Carl L. Teal, Secretary and Treasurer; and J. W. Whatley, Sales Manager.

Kritzer Radiant Coils, Inc., announces the appointments of the following sales representatives for **North** and **South Carolina: Howard V. Caton Co., Charlotte, N. C.,** and **Richard K. Hunter & Co., Greensboro, N. C.**

Wolverine Tube Div., Calumet & Hecla, Inc., has appointed **William R. Morrisey** sales representative for **Pittsburgh** and the surrounding area. Formerly sales representative of Wolverine Tube in Chicago, he will be replacing James McClain.

Bryant Div., Carrier Corp., has designated **Nelson Co.,** wholesale plumbing suppliers in Michigan, distributor of its boilers in areas where it operates. Besides its headquarters in **Detroit,** the company has branches in **northwest Detroit, Grosse Pointe, Royal Oak,** and **Ann Arbor.**

JUST PUBLISHED

The Degree-Day

By Clifford Strock

Editor: AIR CONDITIONING, HEATING and VENTILATING

The new 40-page treatise on The Degree-Day contains comprehensive tables of normal average degree-day data by months for 335 locations in 283 of the largest U. S. cities based on new data from the U. S. Weather Bureau.

In addition, it contains . . .

1. Detailed text covering the origin, principles and basic concept of the degree-day.
2. An explanation of the use of the degree-day as a guide to determining heating plant operating efficiency.
3. A rational method for estimating the fuel or energy requirements of a heating plant.
4. Yearly total number of degree-days for 877 smaller cities in U. S.
5. Normal degree-days for 42 Canadian cities.
6. Normal degree-days for 16 Alaskan cities.
7. Tabular data for 413 locations that give: average dates heating season begins and ends, number of days in normal heating season, average temperatures, heat required per degree-day per 1,000 Btu per hour heat loss, and outside design temperatures.

8. A series of 10 full-page maps in two colors showing:
   - Normal number of degree-days per year for U.S.
   - Normal number of degree-days per year for Canada and Alaska.
   - Winter design temperatures.
   - Date normal heating season begins.
   - Date normal heating season ends.
   - Number of days in normal heating season.
   - Unit heat requirements per degree-day in Btu per 1,000 Btu per hour heat loss at design conditions.
   - Number of hours an intermittent automatic heating plant operates in a normal year.
   - Seasonal load factor in a normal year.

The 8¼" x 11¼" page size permits the use of large-scale maps and easy-to-read charts and tables that make it easy to find the data you want and make accurate calculations. If you are concerned in any way with designing or installing heating systems, or with selling oil or other fuels, the Degree-Day Reference Section will give you the information you need in compact, convenient form.

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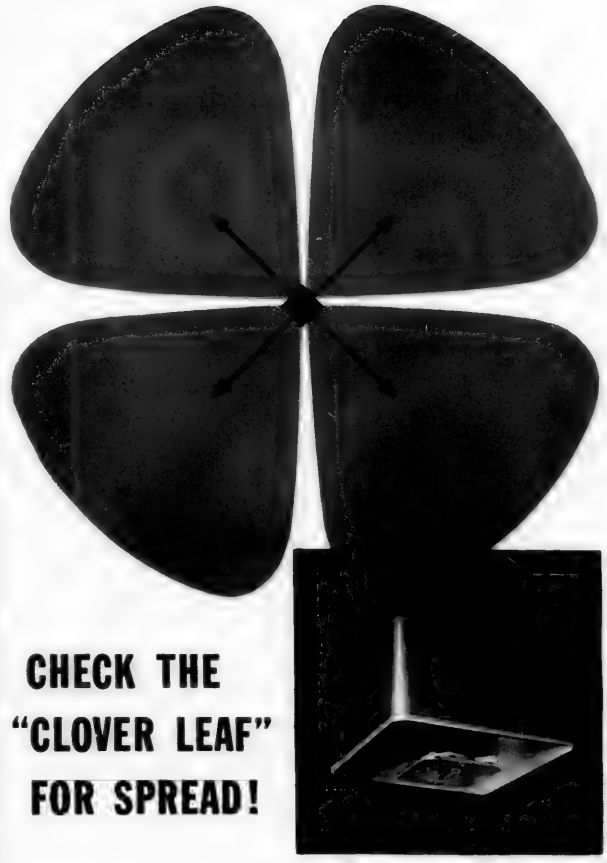
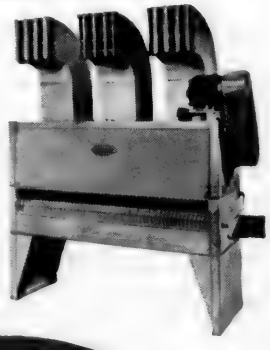


CHECK THE "CLOVER LEAF" FOR SPREAD!

Carrier's new 4-way Unit Heater is the only one with a "clover leaf" pattern of air diffusion. You can hang one of these units in the center of a building up to 100-feet wide and spread heat all the way to the four walls.

Heat goes farther. You save on installation and operating costs. Gives coverage of 3 conventional, fixed-outlet projection unit heaters.

The new 4-way Carrier Unit Heater, for steam or hot water, comes in 8 sizes—from 55,000 to 600,000 Btu hr. You'll find your local jobber-distributor listed in the Classified Telephone Directory.



Carrier Makes a Complete Line of Unit Heaters, including the versatile heat diffuser shown here. Can be floor mounted, vertically or horizontally suspended. Sizes: 80,000 to 1,620,000 Btu/hr. With over 50 years' leadership in temperature control, *Carrier knows heating!* Carrier Corporation, Syracuse, New York.

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air patterns unlimited without blank-offs

AGITAIR® *Custom Made*

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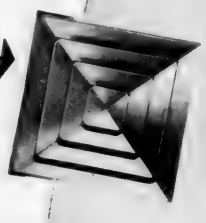
A good piece of equipment is no better than the experience behind it.



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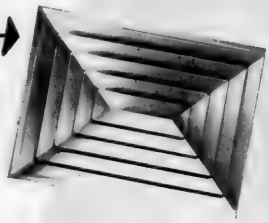
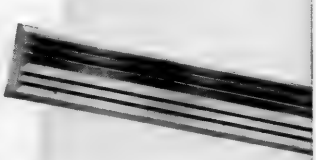
It's the original square and rectangular outlet . . . not just a poor imitation without distinctive features.



. . . better because

The company behind these diffusers has a history for doing things right and guaranteeing results.



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. . . the AQUA UNIT WILL CONTROL IT ELECTRICALLY!

"Just plug it in." No chemicals or "human watch dog" needed.

Now in our 10th Year!

The AQUA unit provides a controlled electrical treatment using a positive power supply. It prevents hard scale formation through a physical change only. Usually, existing scale gradually disintegrates. AQUA is simple, durable and easy to install; costs about 15¢ per month to operate. Savings in cost of present treatment, satisfactory or not, will more than pay for the unit in the first year.

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Complete • Compact • Adaptable

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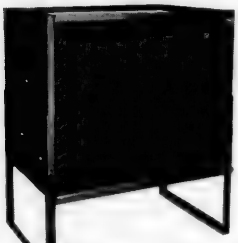

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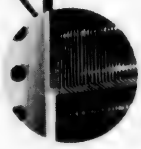

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Large volume gas inset section. Hot gas from compressor expands slightly to accelerate its transfer from a dry gas to a wet vapor.

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Return Bend Cover Plate perforated to permit measured amount of air to be directed over bends and headers.

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lets you

PUT 'EM ON THE ROOF!

The roof, or an upper floor, is the best place for heating and air conditioning equipment, keeps basements free for other revenue-producing uses such as parking, storage, etc.

Korfund Vibration and Noise Control units let you install heavy boilers, compressors, fans, etc., without transmitted vibration to floors below. The photograph shows a boiler being hoisted to the roof of the 8-story 1500 Massachusetts Ave. apartments in Washington, D. C. The completed installation, which included Korfund-mounted boilers, pumps, compressors and fans, has been in operation for well over a year now, and the tenants on the floor immediately below don't even know of the existence of the equipment immediately over their suites.

This is just another example of the effectiveness of Korfund units. Their efficiency did not come about by accident — it's the result of more than a half-century of experience in the vibration and noise control field. Why not put this experience to work for you?

Write for a copy of the booklet, "Air Conditioning Goes Up in the World," which describes Korfund's role in vibration and noise-free upper floor installations. We'll also include a copy of "Vibration Control Specifications for Air Conditioning Equipment." Ask for Bulletin 31.

For specific recommendations contact us or one of the 46 local Korfund offices. Look under "Korfund" in your local Telephone Directory or in Thomas' Register.

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How to design, build or buy an exhaust system that will function adequately and economically, and meet the requirements of law and industrial hygiene. Covers flow of fluids—hood forms—air flow through hoods—pipe resistance—piping design—dust separators—low pressure conveyors—centrifugal exhaust fans—structural details—field measurements and their interpretation.

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The *flow* of gas through ducts, and *fan* performance and control are authoritatively covered in this useful work. Covers principles of moving air through ducts, including elements of fan selection and control, duct arrangement, system characteristics and flow analysis. Gives basic data and describes methods used to calculate system resistance, plus practical information that will help in selecting a fan for a given duty.

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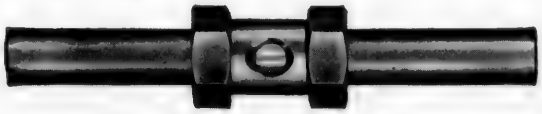

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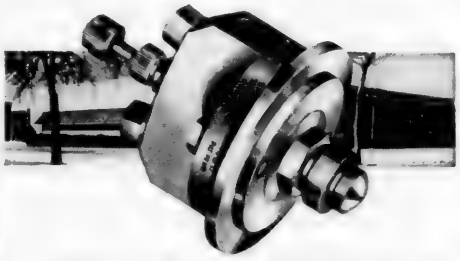

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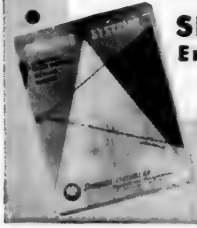

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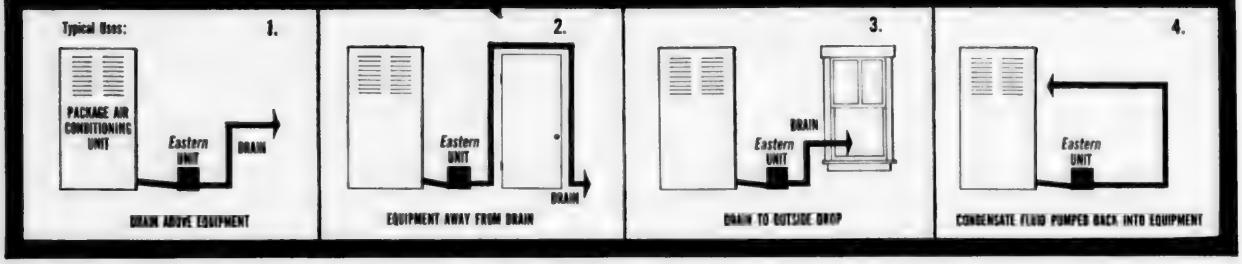

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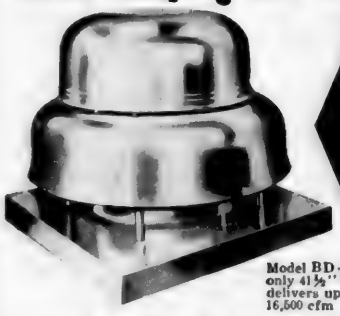
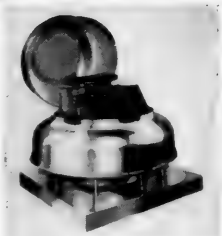


New COOK all-aluminum belt-drive centrifugal ventilator

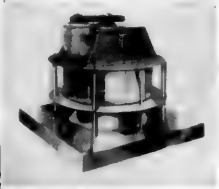
Model BD-43 is only 41½" high, delivers up to 16,500 cfm

- Saves up to 400 lbs. on large models
- Only 6" high roof curb required
- Weatherproof aluminum shell and base
- Aluminum centrifugal wheel
- Compact belt-drive
- Low silhouette
- Non-overloading wheel, low tip speeds
- Rubber-mounted drive assembly
- From 1,000 to 16,500 cfm

The new Cook Model BD belt-drive ventilator eliminates heavy roof loads. Model BD-43, 16,500 cfm size, weighs only 250 pounds. Low tip speeds assure quiet operation. Light starting torque of the aluminum blower wheel increases bearing, motor and belt life. Are also available in Direct Drive Models from 7" to 30" sizes. Write for Catalog HV.



HINGED HOOD, motor and belt-drive easily inspected.

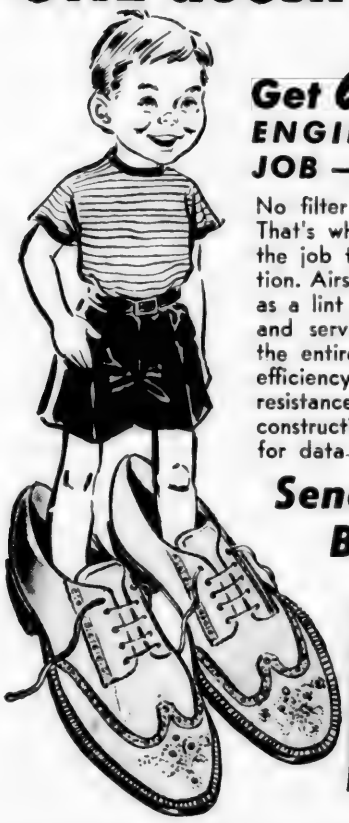


EASY TO CLEAN. Remove four bolts and shell lifts off.

COOK VENTILATORS
LOREN COOK COMPANY
Barre, Ohio

Cook Ventilators are shown in the 1956 Sweets' File

ONE doesn't fit ALL needs!



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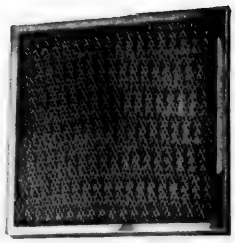

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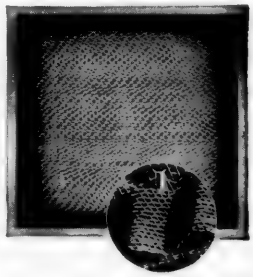

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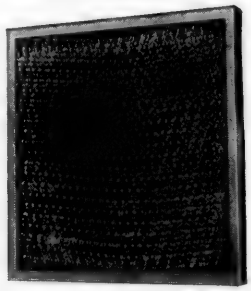

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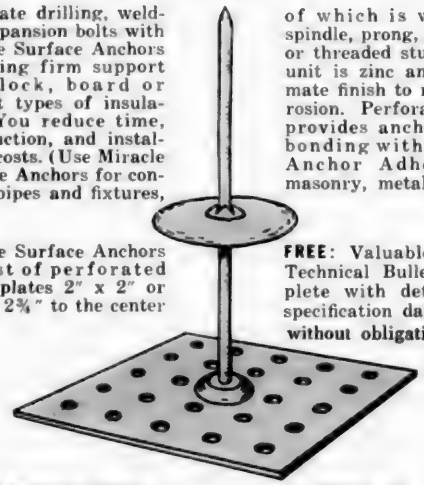

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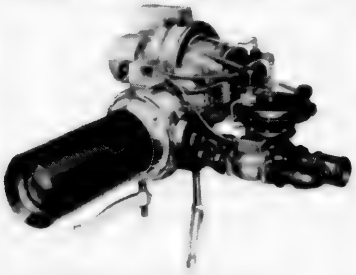

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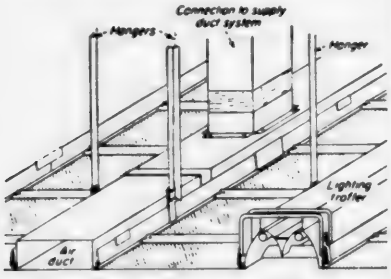

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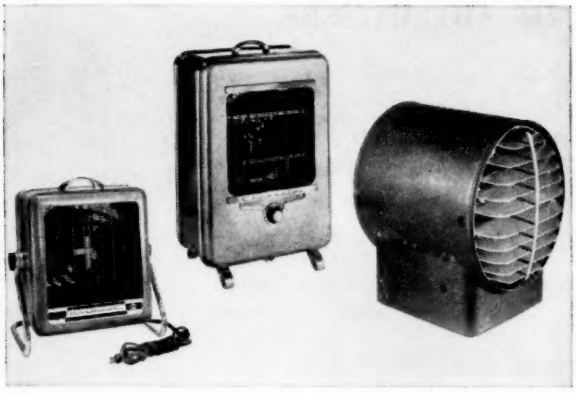

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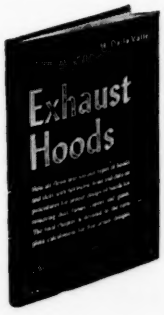

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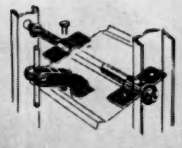

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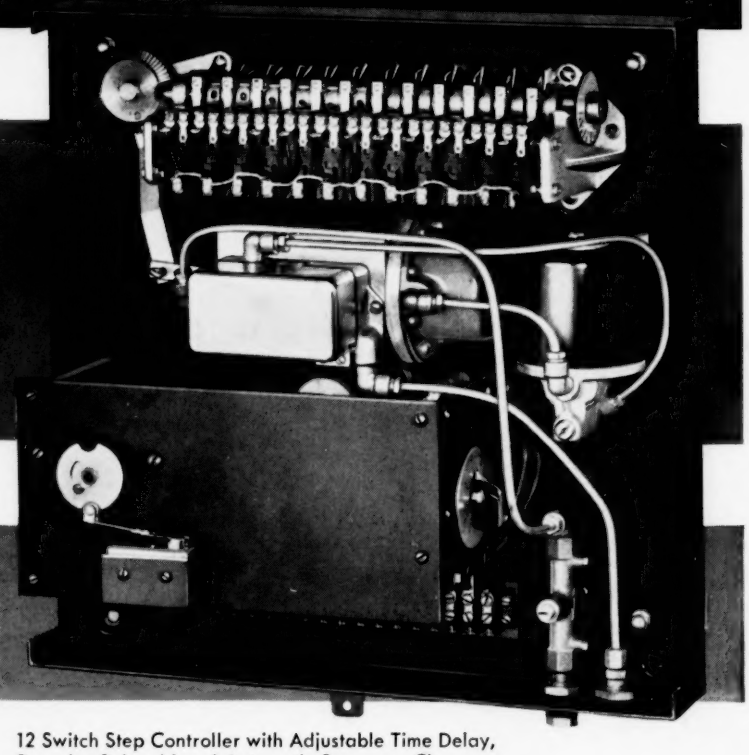

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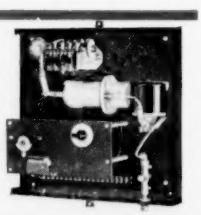

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